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GORDON WHITE, D.D.S.

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ORIGINAL COMMUNICATIONS.

THE CHEMISTRY AND PHARMACOLOGY OF THE TREATMENT OF PULPLESS TEETH AND THEIR SEQUELAE; INCLUDING THE PREPARATION OF THE CANALS FOR FILLING.

By J. P. Buckley, Ph. G., D. D. S., Chicago, Ill.

(Read before the National Dental Association at Its Twentieth Annual Session, Louisville, Ky., July 25-28, 1916.)

IN THIS paper I shall direct your attention to the chemistry and pharmacology of the treatment of pulpless teeth and their sequelae, including the preparation of the canals for filling; and, in view of our present knowledge of focal infection and its relation to systemic disease, I consider this one of the most important subjects before our profession today. The successful management of these teeth is largely a matter of chemistry, and involves the intelligent use of certain chemical agents. As my subject is necessarily broad, I shall delve into it without further preliminaries.

When a patient presents with a pulpless tooth the original pulp tissue is either in a moist gangrenous condition, as a result of the action of bacteria; or a previous attempt has been made to remove the pulp and fill the canals. In either case, the first treatment here, in my opinion, should be a dressing of formocresol, the formula for which, as is well known, is equal parts of formalin and tricresol. Other preparations may be just as effective; but this is the one I have used for years and about which I can speak with assurance. This remedy should be placed in the pulp chamber only, and the dressing retained with cement. This dressing should remain at least twenty-four hours, and in the inte-

rim a radiograph of the tooth and periapical area should be obtained.

The chemical action of formocresol on a gangrenous pulp has been published so often and is now so well known that I need not repeat it here. I know that many good men today advocate the immediate cleansing of a gangrenous canal; but I am firmly of the belief that the safest and best practice is to first apply at least one dressing of formocresol. Gilmer, Moody, and others, have found that the predominating organism in the conditions resulting from a gangrenous pulp, therefore the group active in bringing about the decomposition, is a streptococcus, "with graded variations from a hemolytic streptococcus with a wide zone of hemolysis in the acute abscess to a **streptococcus viridans** in the chronic." One initial treatment of formocresol in these cases, while it may not kill all of the organisms present, will certainly lessen the number and lower the virulency of those remaining. Surely no one will deny the favorable and valuable effect **of formaldehyd gas on the** intermediate and end-products of pulp decomposition. With these poisonous and irritating products chemically neutralized; with the bacteria, inaugurating the process, killed or their virulency lowered, we may the more safely, I believe, work to the root-end, clean and enlarge the canal by a **chemico-mechanical** process. By this I mean the use of chemicals in connection with broaches, reamers, files, and other necessary instruments.

At the present time, so far as I know, there are three chemical agents in general use for this purpose—**metallic potassium** and **sodium**, as advocated by Rhein; **sulphuric acid** by Callahan; and **phenolsulphonic acid** by myself. We will now consider the chemistry and pharmacology of these agents.

Potassium and **Sodium** (K and Na).—This is an alloy composed of a mixture of the two metals. It occurs as a semisolid, silvery-white preparation. Like the metals of which it is composed, it must be kept under a hydrocarbon oil or paraffin to protect it from the air and moisture. It was first introduced in the United States by Schreier, of Vienna, in 1893 at the World's Columbian Dental Congress in Chicago. So far as I am able to learn, Schreier has never published the proportion of the metals in his product. The metals will produce an alloy in varying proportions; and, in my opinion, the more sodium in the mixture the better the preparation will be as long as there is enough potassium to make an alloy when the two metals are properly mixed. No attempt should ever be made to mix the metals unless they are constantly kept under a hydrocarbon oil, such as kerosene, gasoline or benzene; and, even then, it is best to leave the compounding to an experienced chemist or pharmacist.

Technic of Using Schreier's Alloy.—Schreier's preparation comes in a small glass tube, one end of which is open so that the alloy may be covered with paraffin, which prevents undue exposure to air and moisture. It is to the advocacy of Rhein that the preparation owes its popularity in this country. He has developed a technic which, if followed carefully, insures success. With the rubber dam adjusted and everything in readiness, a barbed broach may be pushed thru the paraffin cover and into the metallic mass, and by withdrawing small particles adhere to the broach. It is best to have these particles as near the end of the broach as possible, in which manner the alloy is transferred to the canal. It is presumed that the canal is moist, which is generally the case. A violent reaction at once takes place, the metals attack the water molecule and hydroxids are formed, liberating hydrogen gas. If potassium predominates in the alloy, or even if it is present in equal proportion with the sodium, there is a sufficient amount of heat generated by the reaction to cause the liberated hydrogen to

burn. To set the hydrogen off actively and start it burning requires a temperature of from 500° to 600° C. This burning of the hydrogen is an objection, in my opinion, and it was for this reason that I suggested above the employment of an alloy with sodium predominating. After the initial reaction and the hydroxids are formed, they in turn act upon the fatty end-products, in case of a gangrenous pulp, forming a soluble soap. Where the organic tissue has not been decomposed by bacteria the action of the hydroxids differs somewhat in that the hydroxyl ion unites with the protein constituent of the tissue, forming a soluble alkaline albuminate. In either case, it will be observed, the product formed is soluble, and may be washed out of the canal, leaving it clean and sterile.

The action of potassium and sodium hydroxid on the contents of a canal of a tooth, whether or not the tissue is decomposed, is the same. When the salts and compounds of these metals are internally administered their action differs only in that the potassium ion is more depressant than the sodium ion in its influence upon the cardiac, muscular and nervous systems. But in the canal of a tooth we do not have this pharmacologic effect of the metal ion; here we get only that which is desired—the chemical action of the hydroxyl ion.

Rationale of Rhein's Method.—With this information before us, let us examine the rationale of using Rhein's method of metallic potassium and sodium in the treatment and preparation of canals for filling. The chemistry is correct; a description of the method reads well. The question is whether the preparation is safe and practical. My reply is that it is safe in the hands of those who will master the technic and use it with intelligence and care; but that it is not as practical as other chemicals which may be used with equally good results. It must be remembered that each particle of alloy that is introduced into a canal is decomposed at once as soon as it comes in contact with moisture. This practically means that the initial reaction between the metals and water takes place at the mouth of the canal; for it is difficult to keep the canal free from moisture down to the place at which we stop each succeeding time we enter it with the broach or other instrument. The mere withdrawal of the latter would necessarily moisten the canal, more or less, which had been affected by the remedy. Then, too, if we are using an alloy, like Schreier's, in which there is enough potassium to cause the liberated hydrogen to burn, as a result of the intense heat from the violent reaction between the metals and water, we are constantly moistening the canal; for when hydrogen burns it does so by virtue of the oxygen in the air supporting the combustion, and water (H_2O) is chemically formed. Therefore, it is impossible to keep the canal free from moisture when we use an alloy which reacts on water with such violence that the heat generated causes the hydrogen to burn. Even Rhein himself, with all his experience, technic and care, wisely cautions against the possibility of destroying, or affecting deleteriously, the tooth structure at the mouth of the canal by this "burning" process. Does this not mean, then, that unless extreme care is taken to prevent the initial reaction until the alloy is down into the canal to the point desired, the chemicals which actually do the work down in the canal proper are hydroxids of the metals. If this be true why should we not introduce into the canal and use one of these hydroxids (there is absolutely no advantage in using both) from the beginning? When I want the action of these alkalis in a canal, I generally use, after the method of Pruyn of Chicago, a saturated solution or sodium hydroxid (NaOH). This is a rather thick, syrupy solution, which may be applied as any solution of its kind.

There is another objection to the use of metallic potassium and sodium, especial-

ly a mixture of the metals in which potassium predominates or is present in equal proportion. Granting that with proper care one could keep moisture from the canal as he gradually approached the end in the use of the alloy, I am one of those who firmly believe that we should not burn our way thru the live, healthy cementum at the end of the root from which a live pulp has been removed. One of the first things a student learns in studying chemistry is "that hydrogen burns with the hottest known flame." With a dental granuloma or alveolar abscess in the periapical region, it is a different proposition; but, even here, we may accomplish our purpose with far less destructive chemicals.

This brings us to a discussion of the use of "acids" instead of "alkalis" for the purpose under consideration. The acids which I shall discuss are sulphuric acid (30%) and phenolsulphonic acid (80%).

Sulphuric Acid (H_2SO_4).—This is a colorless, heavy, oily liquid, without odor, and of an extremely sour taste and acid reaction. It is miscible with water and alcohol in all proportions with the evolution of heat. A precaution to be remembered is that when diluting the acid should be added to the water or other diluent, and not the reverse. Perhaps the most useful combination of sulphuric acid in dentistry is phenolsulphonic acid. This agent may be used in nearly every instance where sulphuric acid is indicated, and often to advantage.

Phenolsulphonic Acid ($C_6H_5.HSO_3.OH$).—This product is prepared from synthetic phenol and chemically pure sulphuric acid. It occurs as a faint reddish-colored, heavy syrupy liquid, of a rather phenol-like odor and a characteristic acid taste and reaction. It unites with some metals to form salts, notably potassium, sodium and zinc. It is rather difficult to combine phenol and sulphuric acid so that the resultant mixture may be diluted with water without separation of the original constituents. Therefore, the following specific directions are given: 97 parts by weight of pure concentrated sulphuric acid are gradually added to ninety-three parts by weight of pure phenol and the mixture kept at a temperature of 100°C. for about twenty hours, until only a small percentage of sulphuric acid remains uncombined. When the reaction is thus complete, sufficient distilled water is added to make the finished product assay 80% phenolsulphonic acid. This is the liquid above described and is miscible with water in all proportions.

Advantages of Phenolsulphonic Acid.—The chemical action of sulphuric and phenolsulphonic acids for the use under consideration is practically the same; and they will be discussed here conjointly. Personally, I prefer phenolsulphonic acid. Its consistency is thick and syrupy in the 80% strength as is recommended, thus a drop will adhere to the end of a broach or other applicator, permitting it to be carried even into the canals of upper teeth without difficulty. The acid does not materially affect a broach, and if any of it accidentally gets on the enamel of the crown of the tooth and is not noticed for a time, it does not decalcify and whiten the spot to the extent that sulphuric acid would do. When the acid is worked thru the end of the root, as is desired for cauterization in cases of a dental granuloma or alveolar abscess, it is sufficiently cauterant for the purposes desired, yet not as destructive as sulphuric acid would be; and, owing to its analgesic tendencies, causes less pericementitis. In this connection, however, I want to say that we should not expect to do this work as it must be done, without more or less soreness following the treatment. There is a wide variance in patients regarding the reaction of the periapical tissues to these agents; and in these chronic conditions it is generally best to invite and create inflammatory reaction that the sluggish cells in the area may take on new life and activity. This should not be done,

however, at the expense of unnecessary destruction of tissue.

It might be supposed by those who have not used phenolsulphonic acid that, possessing the above mentioned advantages over plain sulphuric acid, it would be less effective in the canal. I have not found this to be the case. The agent has one possible disadvantage. In using either of these acids, after they have been introduced into the canal for a time and the walls thereof filed with a suitable broach, they should be neutralized with a solution of sodium bicarbonate ($NaHCO_3$). In the case of sulphuric acid the salt formed as a result of the reaction is sodium sulphate (Na_2SO_4), a freely soluble salt. With phenolsulphonic acid the salt formed is sodium phenolsulphonate ($NaSO_3.C_6H_4OH+2H_2O$), which is not as soluble as sodium sulphate. I can conceive how it might be possible in a very fine canal to temporarily block it with the salt formed. An excess of water would readily dissolve the salt or by using a solution of sodium bicarbonate of not more than 10% in strength the salt would be dissolved as soon as it is formed by the reaction. This is a thing which probably would never occur in practice; but I mention it as a possible disadvantage.

Caution in Using Callahan's Method.—In using sulphuric acid Callahan advises the use of a 30% solution. In this strength there is not the danger of charring or carbonizing the pulp tissue which may be in the canal undecomposed, that there would be if a more concentrated solution were used. Sulphuric acid is one of the most corrosive acids. When applied to the skin, accidently or otherwise, in concentrated form, it causes an intense, burning pain, and results in a rapid destruction of tissue. The eschar is at first white, gradually becoming brown and causes a coal-black slough. The corrosive effect upon mucous membranes or the tissue in the periapical region of teeth is still more marked than upon the skin. The acid rapidly abstracts water from the tissue, the alkalies are neutralized and the proteins precipitated; this results in complete destruction of the tissue. This carbonizing of the undecomposed tissue in the canal should be avoided, as it forms a mechanical obstruction difficult to remove; and it is for this reason that the 30% solution is recommended by Callahan.

Technic of Using Acid-Method.—We will now consider the technic of treating pulpless teeth and preparing the canals for filling by the "acid method." I take it that it is thoroly understood that good root-canal work means the use of the rubber dam in all cases, and the strict observance of asepsis. With me at this time, as heretofore, it means asepsis fortified by antiseptic precautions. I make this statement because it is so difficult to observe strict asepsis in our dental offices.

In a large percentage of cases of gangrenous pulps or imperfectly filled canals, the radiograph will disclose a dark and suspicious area at the end of the root. With this evidence, and under the conditions, we may properly diagnose the case as a dental granuloma or alveolar abscess. This growth may be nonpurulent or of the pus-discharging variety. It is only recently that these nonpurulent growths—true dental granulomas— have been recognized as such; and the treatment of such conditions in the past has not been as specifically emphasized as their significance merits.

Non-Purulent Variety.—It makes no difference with me whether this growth is associated with a tooth, the canal of which contains a gangrenous pulp, per se, or an imperfect root-canal filling—the treatment is practically the same. At the first sitting, when the diagnosis is made by the aid of a radiograph, or even before the latter is obtained, under aseptic precautions, the pulp chamber is opened into frequently and a dressing of formocresol is hermetically sealed in for two or three days. Cement should always be used here to retain the dress-

ing. This treatment is for the purpose of neutralizing the gangrenous contents of the canal, or, in a measure, sterilizing the old root filling, as the case may be. If one should attempt to work their way by chemico-mechanical means to and thru the root-end without the previous application of some strong disinfectant, like formocresol, I have found that acute symptoms too frequently develop. This initial formocresol treatment prevents much of the acute symptoms which follow the immediate attempt to reach the root-end, however careful one may be. At the second sitting, I want the radiograph; then with the rubber dam always in place and all necessary instruments sterilized, I carefully work to the apex with phenolsulphonic acid, using in connection herewith fine, smooth, twist and file broaches. This is what I call the chemico-mechanical process. The acid is frequently neutralized with a solution of sodium bicarbonate; and since phenolsulphonic acid is the chemical I am using, for reasons previously mentioned I prefer not to have the alkaline solution more than 10% in strength. If sulphuric acid is the agent used, this point is not so essential. The sodium bicarbonate solution not only chemically neutralizes the acid; but the effervescence caused by the reaction aids materially in removing the "mushy" and disintegrated material from the canal. After I am satisfied that I am to the end of the root and the acid is neutralized and the canal perfectly clean and sufficiently enlarged; then, if the radiograph has indicated a periapical involvement, with the acid and a small stiff broach, I work my way thru into the affected area. Some of the acid is purposely worked thru the end for the express purpose of destroying the growth by cauterization. If I may be pardoned for referring to my own book, from which I have quoted liberally in this paper, I have there spoken of phenolsulphonic acid as a stimulating cauterant and called it a "bone cell stimulant;" and after six years of further use of the agent in these conditions, I am still of this opinion. Personally, I have obtained better results by using phenolsulphonic acid than any other cauterant at my command. When I am thru the root-end, the acid in the canal—not that which has passed thru—is neutralized with the sodium bicarbonate solution, the canal desiccated with modified alcohol (70% alcohol, to which one grain of thymol is added to the fluid ounce), and a dressing of eucalyptol compound (very little of the remedy on the cotton) is sealed in the canal. The formula for eucalyptol compound is menthol two grains, thymol three grains, and eucalyptol one fluid dram. This remedy is used here because it is a stimulating antiseptic, thus fortifying asepsis with antiseptics; but chiefly because it aids in hermetically sealing the canal which is done at this time by using a combination of a good grade of temporary stopping and cement. The heated stopping is placed immediately over the eucalyptol compound dressing and it adheres firmly to the walls of the cavity; the excess is removed and the remaining portion of the cavity filled with cement. This dressing is left for a period of from four days to a week, when, if the case has progressed nicely and pericementitis is absent, the canals are filled.

What becomes of the growth and tissues that were cauterized in the periapical region, I frankly admit I do not know; neither does anyone else. Nature here, as in many other instances, has not revealed her secret; but I do know that it is disposed of in some way, for under the above treatment bone and soft tissue regeneration is effected. When, in all therapeutics, we learn to work with and not against Nature, we will have taken a long step forward. If, in these cases, the root-end can be put and kept in such condition that the surrounding tissues can lie in physiologic contact with it, regeneration is effected; if this biologic condition cannot be brought

about, all medication fails and surgery is the only road to success.

Removing Old Root Filling.—In those cases where a previous attempt had been made to fill the canal with gutta percha, it is necessary, after the initial formocresol treatment, to first remove the old root filling. Generally in these cases there is only one cone in each canal, in which event the acid will soon work its way around the cone when it may be loosened with a suitable instrument and removed in one piece. However, occasionally it becomes necessary to remove a filling where the gutta percha has been firmly packed in the canal. Here the use of xylol, or xylene as it is also called, will aid materially in disintegrating the gutta percha. This is dimethylbenzene ($C_6H_4(CH_3)_2$) and while the agent does not dissolve the gutta percha in the sense that chloroform would, it readily attacks and disintegrates the material making its removal, after a few minutes, comparatively easy. My attention was called to this agent by Best, of Minneapolis; but I think he credits another with its introduction. It may be procured from any pharmacy.

Removing Blockade in Canal.—We should never use any drug or chemical blindly. Therefore, if in working up or down a canal, we find it blocked and are unable to reach the end, instead of going on blindly using only one chemical, whatever it may be and running the risk of making a false pocket, we should stop and ascertain, if possible, and it is generally possible, the nature and character of the material causing the blockade. It may be a remnant of an old gutta percha cone; it may be pulp tissue undecomposed which has been inadvertently packed in the canal; it may be some inorganic material, such as a pulp nodule, secondary dentin, or other loosened inorganic material having been pushed into the canal. If we have reasons for concluding that an old gutta percha filling is causing the blockade, xylol is the chemical to use; if we think it is organic tissue, the alkalis, like potassium and sodium or a strong solution of one of the hydroxids of these metals, is indicated; if inorganic material, sulphuric acid or phenolsulphonic acid will best answer our purpose. My plea is not to become wedded to any one chemical or method. Be eclectic and take the necessary time to do this work carefully and well. It is the most important work you have to do.

Purulent Variety.—The treatment of an alveolar abscess of the purulent or discharging variety is practically the same as previously outlined, except in these cases there is not the danger of acute symptoms arising; therefore, one may safely, under aseptic precautions, work to and thru the root-ends without the initial formocresol treatment. However, even here I believe it is the best practice to use formocresol first; but it is not so essential as in the case of non-purulent growths. After we are thru the end of the root, it is best to first force a physiologic salt solution thru the sinus, and if no sinus is present it is generally best to establish an opening thru the overlying soft tissue and process, then cauterize the track with some stimulating cauterant. Here, I also use phenolsulphonic acid, full strength, as was used above for reasons mentioned. After this my treatment is the same as previously given for a dental granuloma.

Ionization.—Some of my hearers may be surprised that I could discuss at this time the treatment of dental granulomas or alveolar abscesses without the mention of the so-called (I use the word advisedly) **ionization method.** The intimation has gone out from different sources that unless ionization is employed in the treatment of these conditions, a cure will not be affected. I want to brand any such intimation as being absolutely erroneous. There are many chemical agents which act as cauterants and which may be relied upon to eradicate "this pathologic growth at the end of the root." Much, of course, will depend upon the extent of the destruction of the perice-

mental membrane and the consequent amount of denuded root-end as a result of the granulomatous growth. As stated above, for years I have advocated and used phenolsulphonic acid for both nonpurulent and pus discharging varieties; and I am here to state that I have been curing these conditions. I do not wish to imply that phenolsulphonic acid is the only agent that will accomplish favorable results; but it is the one I have successfully used. What a dismal old world this would be if there were only one royal road to success in any line of human endeavor! I do not object to anyone using so-called ionization. I know results may be obtained by the proper use of the method; but I do object strenuously to the intimation which is prevalent in some quarters that those who are not using this method are failing to cure their cases.

Ionic Theory.—Now let us discuss the ionic theory from the chemical and pharmacologic viewpoint. Ionization in chemistry means the act of dissociating the ions of a salt or compound by passing it in solution or by means of the electric current. The men who have been attempting to cure, and I want to say that in many instances they do cure, dental granulomas or alveolar abscesses by dissociating the ions of certain salts—notably zinc chlorid, with the electric current, have been taught by Rhein—the most ardent advocate of the method and, so far as I know, the originator of it for this purpose, that results are obtained by virtue of the infected tissues in the area being sterilized by the so-called ionization. At the recent Tri-State meeting held in Kansas City in March, Price, of Cleveland, took issue with Rhein on this point; and said that he had aspirated in many cases after using the current by Rhein's method and that he was able in nearly every instance to make a culture from the germs thus obtained from the area supposed to have been sterilized. The aspiration was done immediately after the current and salt solution were employed. This does not prove that we cannot cure these conditions by this method of treatment. Rhein and others have proven conclusively that such conditions can be so cured; but it does prove that the results are not obtained by complete sterilization as claimed. Price further made the statement that ionization as such cannot be accomplished in the manner explained by Rhein; and Price is of the opinion that what is really done by the current in these cases is cauterization of the affected area. The point I wish to make is this: If cauterization of the tissue involved will effect a cure in dental granulomas or alveolar abscesses, as I and many others know it will, the proposition resolves itself into the question: What is the most practical and effectual means of bringing about this result? It is simply a question which each one must decide for themselves; and each should use those agents and methods which in their hands offers the greatest opportunity for success. It is wrong for any man, especially one who is looked upon as an authority, to claim that there is only one method or means of accomplishing definite results, and that that method is the one which he champions, and perhaps has originated. It is wrong because it is not true; and, not being true, it is discouraging to the thousands of men in the profession who are anxious to do honest conscientious root canal work, but who are absolutely at a loss at this time as to just how good work may be done. We need here, as in all lines of dental practice, a standard on which we may all agree. My rule in life has been, "how simple—not how complicated;" and, following this rule in therapeutics, I have met with a fair measure of success. At the Tri-State meeting above mentioned, one thousand men, from eighteen different states, sat for an entire week—hungry for the truth. I am interested in these men—the great bulk of our profession; and I plead for simplicity of meth-

ods, keeping in mind always the results obtained.

In closing I want to repeat that the handling of pulpless teeth in the light of our present knowledge of focal infection and its relation to systemic disease, is one of the most important problems before the profession today; and let us never lose sight of the fact that the treatment of a dental granuloma or an alveolar abscess is a biologic problem and he who ignores biologic laws must expect failure.

I had intended to make a few chemical experiments and show just a few slides to illustrate certain points in the paper, but as the hour is late and your program crowded, I will not do this unless someone in the discussion questions the statements here made.

Discussions.

H. E. Friesell, D.D.S., Pittsburgh, Pa.

First, I want to compliment Dr. Buckley upon the excellence of his paper;—the simple, terse and direct way in which he has presented the subject to us, which is characteristic of Dr Buckley.

He has said that the filling of root canals is one of the most important subjects in dentistry today; and I feel sure that we all agree with him. When we look at the lantern slides that are shown by our various root canal men and our research men; when we listen to the statements made by enthusiasts on one line of treatment or another, I think that most of us are inclined to feel sorry that we have any teeth. One man becomes conscientiously enthusiastic about a certain method of treating teeth, and in a little while he begins to believe that that is the only method; that if teeth are not treated that way that every patient must die several very complicated deaths. Has it ever occurred to these enthusiasts that the patient has some rights in the matter—even if he is not permitted to have any inclinations? Now it may be all right to say to your patient "You must have such and such a thing done in such and such a way; if you do not have it done that way that tooth must come out, or you are going to die." The patient, if he feels as I presume most of us would, probably tells the dentist, "All right, I will die—but I will take my time about it!"

In dentistry we run to extremes. We are apt to become too enthusiastic. If this tendency could be restrained we would reach a desirable goal much more readily. Let us be intelligently conservative; let us not accept every statement that is given to us on some of these matters as absolutely proven until it is proven. Claiming or stating a thing and believing it yourself is altogether different from actually proving it to others, or demonstrating its truth.

I have not had the opportunity to test properly the ionization method. I have no doubt that excellent results are being obtained and can be obtained; but I do want to substantiate practically everything that Dr. Buckley has said in his paper in regard to the use of formocresol, sulphuric acid and pheno-sulphonic acid. Satisfactory results can be obtained, and the methods are so simple that the average individual can carry them out.

Good results can be obtained by almost any method in the hands of a careful technician, in the hands of a careful operator; but it seems to me that the best place to demonstrate a method's practicability for an average practitioner is in the clinic of the dental school. Dr. Buckley's method of using formocresol, and Dr. Callahan's original method of using sulphuric acid—I do not mean his modification of it, (as to the success of of which I am not informed) have given most excellent results in the college clinic, where from 20,000 to 25,000 patients a year are treated by upwards of a hundred different operators. I feel like saying embryo operators. These methods have so simplified a thing that previously was a nightmare to those in charge of the Infirmary, that I think it

is only proper for me at this time to publicly thank Dr. Buckley for the excellent results that his methods have given us in the Dental College Infirmary (Applause).

H. B. Holmes, D.D.S., Louisville, Ky.

It is a mistake for me to attempt to discuss a paper of Dr. Buckley's, for several reasons, the first of which is obvious—incompetency; but as I have used his text in my teaching since it was given to the profession, and have used his arguments as my guide in my clinical work in the Infirmary, I naturally can only agree with the statements which he advances.

Dr. Buckley closed his paper by saying that in the light of our present knowledge of focal infection and its relation to systemic diseases, this is one of the most serious dental problems. We are all a unit on this fact; and in the name of the profession, I want to go on record as saying, that no man has done more or given more light to us along the line of dental therapeutics; if any man in the profession is deserving of having a monument erected to him while he still lives, it is Dr. John P. Buckley, of Chicago. Long may we sit at his feet, and learn!

When Dr. Buckley has discussed a subject, especially one of this nature, so thoroly and so logically and so scientifically does he delve, that but little, if anything, remains for others to say. And today especially I feel that he has exhausted the subject in this masterly address which he has given us. He is one of that class who are sure they are right and then goes ahead. His statements assume the hue of scientific facts which one cannot refute. True, one might compliment, but compliments do not get one very far when traveling a rough and uncertain road. In my discussion I find myself compelled to agree with the essayist in nearly every phase of his argument.

When a patient presents himself with pulpless tooth I invariably—unless there be pain or swelling—and this condition the essayist did not mention, but I am sure he deemed this unnecessary—open into with a suitable size round burr and excavate the contents of the pulp chamber only, sealing with cement into the pulp chamber my dressing of formocresol. Its action on the contents present is a specific, uniting as it does, chemically with the agents resulting from the pulp decomposition and forming a new substance.

In my opinion it is by far the safest and the most rational treatment to never disturb the contents of these canals until the second sitting. After these canals are opened the operator should never depend on mechanical means alone to cleanse and enlarge the canal, as this alone will only partially clean the canal, and we should not allow ourselves to be deceived by thinking that we can thoroly cleanse a canal by simply using mechanical means. But with the mechanical plus the chemical, I maintain, if proper patience and technic be employed, the average canal can be satisfactorily opened, cleansed and filled.

The essayist has referred to three chemical agents for this purpose. As to the metallic K and sodium method as advocated by Rhein, I can discuss this only theoretically, which would be but a repetition of the thoughts of the essayist. I have always considered it as a method more to be used by the specialist of that method rather than by the general practitioner, and while its technic can be mastered by carefully repeating efforts, I have preferred to use other simpler, and as I see it, safer methods, and methods with which I feel I have attained at least a fair degree of success.

For this work I much prefer the acids rather than the alkalies, so much so as to entirely eliminate the latter. In using the acid treatment one is not compelled to decide between the H_2SO, or the pheno-sulphonic 80%, but use the one which he can employ most advantageously. I prefer the pheno-sulphonic for

practically the same reasons the essayist has mentioned, especially as to the fact of its being of a denser consistency; therefore more easily handled, and if its having a less tendency to char or cauterize the structures with which it comes in contact. However, the charring effect of the H_2SO_4 is due to the use of the operator employing it in too strong a solution. I still find numbers of practitioners using the 50%, which is too strong, and really objectionable. By using the 30 per cent this objection is practically overcome.

I would like to call attention to the use of phenolsulphonic in those canals which we regard as fine and tortuous, so much so that we are told by some that if they are not disturbed they will not cause further trouble, (beware of the voice of the tempter) which they invariably do. Now if you will take a fine twist broach and start into the mouth of that mesial canal of the lower molar, or buccal roots of superior molars which you suspect is going to be fine and tortuous, and carefully twist it, you will twist it thru the root canal, and as you twist it you will work along down into the canal your phenolsulphonic acid. Having done this carefully, and having been careful not to have used a broach that is too large—for in that case there is danger of packing the tissue into the canal—you will be surprised to find that you will often have a fairly respectable sized canal and one which may be filled, when some of us have been leading ourselves to believe they were so tortuous and so fine as to be inaccessible. If you will take a canal also from which you have removed the pulps and treated it in a gangrenous case, I do not care how you have treated the canal, any one that heretofore you have been satisfied was in a condition to fill, if you will work this acid into these canals you will be surprised at the amount of mushy debris which you can work out of these selfsame canals. I am thoroly convinced that the only way to properly cleanse and treat these cases is the combination of the mechanical and chemical means, and I want to assure every one present that if they will use the technic suggested by the master of canal work, Dr. Buckley, they will make no mistake.

This acid is one of the best bone cell stimulants, and in my hands—in the case of chronic abscessed conditions—after having forced thru the end of the root the phenolsulphonic, which will likely change the nature of the case from the chronic to the acute, if healing does not occur in a reasonable length of time, I feel that it has progressed beyond the power of medicaments, and nothing remains but to resort to root amputation.

R. Ottolengui, D.D.S., New York, N. Y.

If you will start that monument for Dr. Buckley before he is dead, I will subscribe to it (Applause).

I am not going to continue this eulogy, because I can summarize by saying that out of thirteen pages of Dr. Buckley's paper I agree with eleven and three-quarter pages. I will address myself particularly to the other page and a quarter.

To many jurists, particularly those who make a special study of the weight of evidence, the value of a piece of testimony is very often determined by a single statement of a witness. I may entirely misjudge Dr. Buckley, but because of one single statement, I believe that he is entirely unfamiliar with the practice of using sodium potassium. I believe that Dr. Buckley is so thoroly a chemist that he has looked upon this almost entirely from the chemical aspect. I am so poor a chemist that I cannot deny one of the chemical charges he makes about sodium potassium. But he has undertaken to give you the technical usage, and if he has used it as he has described. I am not surprised that he should have abandoned it, because no one could succeed with it in that way.

I want to call your attention to the fact that he has used a very splendid

term, the chemical-mechanical method of cleansing out the canal. I want also to call your attention to the fact that when he is using phenolsulphonic acid, he likewise depends upon something mechanical to aid him, but when he comes to sodium potassium he seems to expect it to work entirely as a chemical agent and he deprives it of all mechanical help. Let me quote. Speaking of Rhein, he says: He has developed a technic which, if followed carefully, insures success. With the rubber dam adjusted and everything in readiness a barbed broach may be pushed thru the paraffine cover and into the metallic mass, and by gently withdrawing small particles adhere to the broach. It is best to have these particles as near the end of the broach as possible, in which manner the alloy is transferred to the canal.

You cannot enlarge a canal with barbed broaches, and the only reason I see for using barbed broaches is to cause the broach to take up the sodium potassium. We can attain that end perfectly by using a twist broach, such as is made under the name of the Young Aseptic broach. The reason why that broach has been adopted by those who use this method is, that it does pick up and carry the sodium potassium and that in using it in the canal we get a chemical mechanical frictional action—and we must have both the mechanical as well as the chemical. Dr. Buckley says that this method "is safe in the hands of those who will master the technic and use it with intelligence and care, and that it is not as practical as other chemicals, which may be used with equally good results."

I want to disabuse your minds of the idea that there is any mystery or any special skill required in using this remedy. There are at the present time two hundred men by actual count in New York who are using this method successfully. Now of course I will have to explain what I mean by "successfully." I will do that presently. Later on Buckley says, in warning you against the destruction of the tissue, that "Even Rhein himself, with all his experience, technic and care, wisely cautions against the possibility of destroying or affecting deleteriously the tooth structure at the mouth of the canal by this 'burning' process."

I have been using this method since it was introduced in 1893. I think I have been as intimately associated with Dr. Rhein as any one. I have read all of his papers; I have heard his lectures time and again. I have published many of his papers, and I cannot recall ever having had any such experience in my practice. On the contrary, after one or two or three hours' use of this material, it is frequently necessary to enlarge the entrance to the canal by mechanical means with the engine. So I think you may abandon the fear of injury to apical tissues with sodium and potassium.

One more point. Dr. Buckley says further on: "I am one of those who firmly believe that we should not burn our way thru the live healthy cementum at the end of the root from which a live pulp has been removed." Now gentlemen, I firmly agree with that. I will not say that Dr. Rhein has not claimed that you must go thru the end of such a tooth with sodium potassium; but I certainly doubt it. I cannot recall his ever having proposed such a thing; certainly I have never done so.

It seems to me that the time is rapidly approaching when we must divide this subject into two different parts; one, the treatment of the well tooth, the other the treatment of the sick tooth. I mean by a "well" tooth a tooth that comes to us with the living pulp in it. There is nothing about that technic which should not be mastered by ninety-nine per cent. of the dental profession. They should be able to remove living pulp tissue without going thru the end of the root, and without injury to, or infection of, the apical area; and they

should fill such a tooth so that it would remain well. Men who cannot do that are no longer entitled to practice dentistry in the view of what we are learning about infection.

The treatment of infected teeth is another proposition; and the research workers are proving to us that we can in a few years perhaps have a library full of literature on this important subject; and if we do not do it practically, at least mentally we should divide this part of dentistry into a special phase, and perhaps call it "pathodontia," or the treatment of diseased teeth, and the pathodontist should understand everything that Price or Rosenow or Callahan or Tom Hartzell can tell us, and then be able to treat teeth scientifically.

Now that brings me to ionization. I will read from the paper. The Doctor says: "I do not object to any one using so-called ionization. I know that results may be obtained by the proper use of the method." He admits that men have used ionization and have effected cures possibly. Nevertheless that there are other means of doing this. He thinks that the man who practices ionization should not claim that it is the only way. Gentlemen, this proposition is too big for personalities. No man should be enamored of his own ways; but we should ask our best friend to prove the truth of his statements.

Now the men who have been practicing ionization have been bringing to you what I think is at least good evidence with the x-ray as to a continued improvement of the conditions around the end of the root by ionization or after ionization; and I do not think those men are unfair in asking Dr. Buckley, Dr. Friesell and others to bring us a few radiographs of granulomas that they have cured by pumping some acid thru the end of the root. It is not sufficient to say that the tooth has remained comfortable, because Hartzell tells us that many men and women die from these "comfortable" teeth. We want better evidence than that. I am going to show you, if you will permit me to show you, about seven lantern slides. It is only fair that men who have practiced ionization should select the cases that they have cured rather than the cases that they have not cured. Personally, I have failed to cure by ionization a great many more cases than I have cured. I think the same is true of any man who may be using a certain method. There is no certain method—they are all uncertain.

Now let me touch on the subject of ionization. In dealing with infected teeth, aside from root amputation we have two recourses. Some men, such as the essayist, Dr. Friesell, Dr. Biddle and others, recommend the forcing of powerful escharotics or acids thru the end of the root and into the diseased tissue. Others assure us that ionization will bring about a cure. I have been experimenting considerably with the ionization method and I cannot say that I believe it to be the radical and entirely reliable cure which its most ardent disciples claim. In my own practice during the past two years we have made it a habit to make cultures from all diseased teeth and in a brief way I may say that whilst we have in a few instances apparently cured apical abscesses where the germ was a staphylococcus, we have never yet cured a pus case where the germ was a streptococcus. This may or may not have any significance. I merely mention it as a clinical record. We have failed also to eradicate so-called blind abscesses or granulomas, where the shadows on the radiograph indicated that they were of any considerable size. In one instance, however, I did obtain a remarkably good result with a granuloma of considerable extent. I therefore append the radiographic evidence. This was a lower incisor in which the pulp had been devitalized by a blow. Suspecting from the color of the tooth and the slightly fractured corner that the pulp might be dead, I made a radiograph (Fig. 1) in which we see an extensive area, presumably occu-

pied by granuloma. This area was really more extensive than this particular picture indicates, as will be seen by close scrutiny of Fig. 3, where I was fortunate enough to get the entire field into the radiograph. This tooth was ionized three

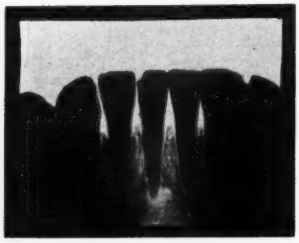


Figure 1.

times, one week between each sitting. The canal was then filled and, as will be seen, considerable of the cone was forced thru the end of the tooth. It was largely because of this case that I abandoned the use of long cones at the beginning of root canal fillings. However, this case at

Figure 2.

least proves that if gutta-percha is kept in an aseptic condition it will be wonderfully well tolerated by the apical tissues. Figure 2 shows the condition at the time when the root filling was introduced, which was five weeks after Figure 1. Figure 3 is from a radiograph taken one year after the root was filled and I think is very fair evidence when compared with Figure 1 that the diseased area has been filled in with bone. That this cure was really a cure is evidenced by Figure 4, made three years after the root filling.

In regard to this case, however, I would say that personally I would not place complete reliance upon ionization in cases as extensive as this. My prac-

Figure 3.

tice is to use the ionization method and follow up the case with radiographic investigations for at least a year, at which time if new bone is not seen to be filling in, I resort to root amputation and it is only fair to say that in two or three cases of this kind when cutting down

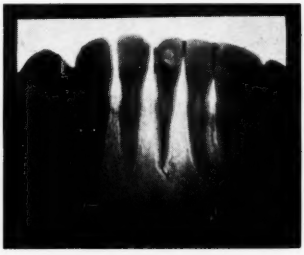


Figure 4.

these root ends I have found granulomas still present. This, I think, is very good evidence that we must be very careful about claiming that cases are cured. I think, also, it is fair to say to those gentlemen who rely upon escharotics, that they should follow a similar course and prove up their cured cases with radiographic proof, at least a year after treatment before they can rationally expect others to believe that cases are really

cured merely because the teeth give no trouble.

I believe I have mentioned the words "pathodontia" and "pathodontist." May I add a few words to elaborate the meaning of these new words, which I think in time may come into use?

We are today confronted by a new situation. Diseased teeth now form the links which will bind together physicians and dentists. The former, with little knowledge of dentistry and with little appreciation of the value of teeth, are already ordering the wholesale extraction of suspected organs, while the majority of us dentists, when we receive these messages from our medical friends, are quite in a quandry as to whether to obey the mandate or risk the patient's life by trying to save the teeth. It seems, therefore, that we must more closely study the pathology of the dental organs, hence the word pathodontia.

May I relate one case as an example of pathodontic treatment? The patient was suffering from an arthritic disturbance in one knee joint, and also a heart lesion which frequently caused swoonings. Examinations made by good medical men, and in one prominent hospital, excluded such possibilities as gall stones and other internal foci of infection, but their radiographs disclosed what I am now calling radiolucent areas about the ends of three teeth. These teeth were ordered extracted. This caused the patient great distress as it meant a severe loss to her, not only of masticating function but likewise because it would open up visible spaces in the anterior portion of her mouth. This woman, being the wife of a friend of mine, I asked the husband's permission to take over the case and this was granted. Upon opening the right upper molar, I found that the previous attendant had punctured the roots and that curative treatment was impossible. This tooth therefore, was extracted. The bicuspid on the opposite side above did not seem to me to require anything but correct root canal treatment and this was accomplished, at least to my satisfaction. We come now to a left lower molar and the radiograph (Fig. 5) altho not as good as I would wish it to be will show that, judging by the radiolucent area at the end of the anterior root, it is not great enough to establish the existence of a true granuloma, the indication rather being that the infection had only reached an early stage of inflammatory thickening of the membrane. I decided, therefore, to undertake the saving of this tooth. Cultures were taken from all three roots and when incubated proved to be a pure culture of pneumo-

Figure 5.

coccus. Figure 6 shows that all three canals had been opened to the foramina.

Ionization was used for five minutes in each root canal and the tooth sealed up for a week.

Quite casually I happened to make the remark, "I suppose the medical men ordered the extraction of teeth because you have so many, yet if one of your toes were infected, even tho you have ten, the doctor would not ask you to have your toe cut off." To my surprise, the patient replied, "Curiously enough, I have an ulcer on one of my toes." I immediately asked for an opportunity to examine it and found an ugly looking sore covered with a chiropodist's plaster. This was removed and cultures taken which demonstrated the presence of streptococcus pyogenes. I mention this merely to show you that in the hospital routine, while extensive and expensive examina-

tions of the internal organs may be made, an infection on the surface of the body, at least in the case, was quite overlooked. I call your attention also to the fact that the toe was certainly quite as near the knee as the teeth. It is unnecessary to extend the history of this case at great length. Suffice it to say that I had the ulcer on the toe surgically operated on but that it proved so persistent that even at the present time, almost a year later, the surgeon desires to amputate that organ.

Figure 6.

Figure 7.

In regard to the tooth, I gave this patient weekly sittings, each week seeing her two days. At each visit the tooth would be opened and an attempt made to get cultures from beyond the ends of the roots. At the end of the first week the distal root, which from the radiograph seemed to have been the one least affected, proved negative and this canal was immediately filled. (Fig. 7). At the next sitting, cultures were attempted from the two remaining roots and the mesio-buccal proved negative and was filled. (Fig. 8). Finally, a week later, as negative results were obtained from the last remaining root canal this also was filled. (Figure 9). About a year after this work was done, a radiograph seemed to indicate that all disturbance had cleared up from the ends of these teeth. The patient had ceased to have attacks of swoons, or at least they were occurring at more infrequent intervals. It cannot he said, however, that the mere treatment of the teeth and toe really resulted in a cure, nor do I think it should be expected that even if these local foci had primarily caused the disturbance the mere removal of the primary lesion will completely eradicate the secondary systemic disturbances. The best we can hope is that by stopping these infections we prevent the continued reinfections from these particular foci and thus give Nature a better opportunity to improve the general health.

Figure 8.

Figure 9.

J. P. BUCKLEY, Chicago, Ills. Ladies and Gentlemen: I appreciate the complimentary remarks of Dr. Friesell and Dr. Holmes; and I believe that these men are equally sincere when they say that they get results, as Dr. Ottolengui is when he says he gets a result, which we know he does. I am not looking for a monument, either living or dead; all I am looking for is facts and honest criticism, just such as Dr. Ottolengui has given. I told you I would not take the time to show you the slides I have, or perform any chemical experiments unless someone questioned what I had stated in my paper. Now after this disagreement with a page and a quarter of my paper by Dr. Ottolengui and also his challenge that I show a slide that would indicate as good results as those he has shown, I must ask your indulgence while I accept the challenge and relate briefly the histories of a few cases treated after the methods advocated.

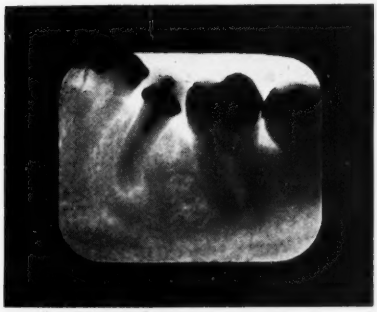


Figure 1.

Figure 2.

Case No. 1. Patient, female; age about 32 years.

Presented in March, 1916, suffering with intermittent, radiating pains in the back of her head and both sides of her neck. The general condition of the patient was good, except she was rather depressed from overwork. She had had several radiographs taken the preceding September. A non-purulent dental granuloma was disclosed on the lower second biscupid on either side. Figure 1 shows the granuloma on the lower right bicuspid.

Treatment.—(a) Removed porcelain crown on the lower right bicuspid on March 1st and sealed formocresol in the canal. On March 3rd, the canal was cleaned and opened with xylol and phenolsulphonic acid and eucalyptol compound sealed in. The canal was filled March 8th, when radiograph for Figure 2 was taken. The tooth was giving no local trouble apparently when treatment was begun; nor was there any soreness manifested thruout the treatment. Radiograph for Figure 3 was taken September 25th, about 6½ months after root-filling operation. (b) Figure 4 shows the granuloma on the lower left bicuspid. As was mentioned with the case on the opposite side of the mouth, this tooth also was giving no apparent trouble when treatment was begun. The gold crown was removed on March 4th, and, contrary to my usual custom, I immediately worked to the apex with xylol and phenolsulphonic acid. Sealed eucalyptol compound in the canal. Patient returned March 8th, giving history of acute apical pericementitis, which was still in evidence. Placed diagnostic wire in the canal with formocresol dressing, when radiograph for Figure 5 was taken. On March 14th the soreness had subsided entirely, when the canal was filled. This

case illustrates the value of the initial formocresol dressing, which you will notice was not used here. It was necessary, also, to remove the pulp in the first molar which had carried a large

Figure 3.

gold inlay, as it was found subsequently that the canals were almost completely filled with secondary dentin. Radiograph for Figure 6 was taken September 25th, about 6½ months after root-filling

Figure 4.

operation on bicuspid and about 2 months on the molar. After the granulomas were treated and before removing the pulp in the molar, the radiating pains in the back of the head had completely disappeared.

Case No. 2. Patient, male; age about 55 years.

Blood pressure abnormally high, and occasionally had spells of dizziness. Two involved teeth were extracted and upper lateral treated for gangrenous pulp.

Treatment.—On May 31, 1916, the canal was exposed and a dressing of formocre-

Figure 5.

sol was sealed in. The patient could not return until June 29th, when the canal was cleaned and enlarged with phenolsulphonic acid; and, unexpectedly, an abscess sac was ruptured when pus,

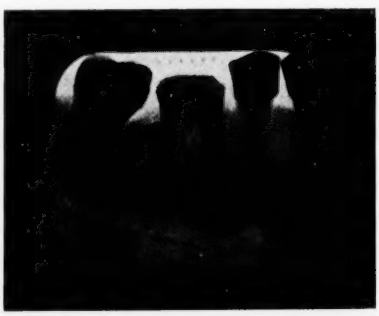


Figure 6.

thick and yellow, with streaks of blood, flowed freely from the canal. The discharge was checked and the acid worked thru the end of the root and diagnostic wire with formocresol dressing was sealed in the canal. On this date (June 29th) radiograph for Figure 7 was taken. Owing to absence from city, patient did not return until July 20th, when root-filling

was inserted. Radiograph for Figure 8 was taken September 9th, about 7 weeks after root-filling operation and about nine weeks after pus was noticed. This case illustrates the value of the radio-

Figure 7.

graph in the treatment of all cases of pulpless teeth. Notice how the fluid gutta percha escaped thru the multiple foramina. Radiograph for Figure 9 was taken January 4th, 1917, about 5 months after root-filling operation.

Figure 8.

Case No. 3. Patient, female; age about 45 years.

Physical condition good. Presented May 5, 1916. No pain or discomfort of any kind; but she had noticed a discharging sinus in the region of the apex of the upper left second bicuspid. So far as the patient knew, the abscess had been standing for about two years. Ordered radiograph for Figure 10.

Treatment.—Opened into the pulp chamber on the above date (May 5) and cleaned canal with phenolsulphonic acid,

Figure 9.

working the same thru the end of the root and sinus, after using physiologic salt solution. As there was a bad odor, formocresol was sealed in the canal. On May 8th the canal as filled and radiograph for Figure 11 was taken. Radio-

Figure 10.

graph for Figure 12 was taken December 30th, about 7 months after treatment and root-filling operation.

Case No. 4. Patient, male; age about 40 years.

Nervous, not in good physical condition. An upper right first molar had been treated and filled about three

months previous to the time patient was referred. Complained that this tooth "never felt right since it had been treated." Radiograph for Fig. 13 was taken May 26, 1916, before I saw the patient.

Figure 11.

Treatment.—On June 10th the amalgam filling was removed, as was also the old root-filling, using xylol and phenolsulphonic acid. The lingual canal seemed blocked and a false pocket had been

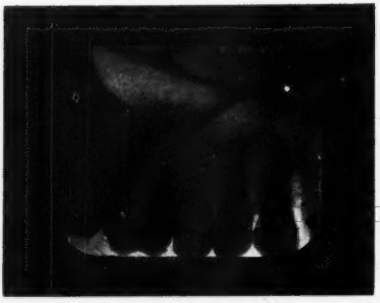


Figure 12.

made. The canal proper appeared to be blocked with undecomposed pulp tissue. I used a saturated solution of sodium hydroxid and in five minutes' time, with a small twist broach, the end of the root was reached. The alkali was then neutralized with phenolsulphonic acid. Time consumed for the entire operation at this sitting—one hour. I mention this here simply to show that if we go at these cases in an intelligent manner, it does not require as much time as some operators have led us to believe. The

Figure 13.

diagnostic wires were also put in at this sitting with a dressing of eucalyptol compound, when radiograph for Fig. 14

Figure 14.

was taken. This radiograph shows that the wire in the mesiolingual canal was not in as far as the canal had been explored, or else, as proved to be the case, the canal was not properly opened. Patient returned June 16th. Thinking undecomposed pulp tissue also blocked this canal, the saturated solution of sodium hydroxid was used. In three minutes'

time the end of the root was reached. The alkali was neutralized with phenolsulphonic acid, canals desiccated and filled. Ordered radiograph for Fig. 15. The patient called when he was in the city, late in September, and reported tooth entirely comfortable.

Case No. 5. Patient, male; age about 38 years.

The vital teeth shown in Fig. 16 had carried an inlay bridge for several years. Decay had progressed under the molar inlay, and when patient presented the pulp of this tooth was highly congested and aching severely.

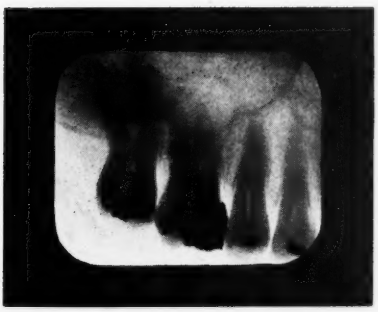


Figure 15.

Treatment.—When I first saw the patient, the pulp was caused to bleed and phenol compound sealed in the cavity. Two days later, the patient returned, giving history of tooth being comfortable. At this time the bridge was removed and devitalized fibre applied. Ordered radiograph, Fig. 16. On account of my leaving the city and the patient being a dentist, the arsenical dressing was left for one week, with instructions to remove the same in case tooth manifested soreness. This was not necessary and the patient returned as per appointment. Contrary to my usual custom of using formocresol after a pulp has been poisoned with arsenic trioxid, I removed the pulp at this sitting and cleaned the canals with phenolsulphonic acid. Eucalyptol compound was then sealed in, and four days later canals were filled. Radiograph for Fig. 17 was taken about two weeks after root-filling operation. Notice how the inferior dental canal is shown at the end of the distal root of the

Figure 16.

molar tooth. The radiographer diagnosed this as "an abscess," a mistake frequently made.

Case No. 6. Patient, female; age 11 years.

Figure 17.

While playing at school, an accident occurred in which both upper central incissors were broken off—one exposing the pulp, the other nearly exposed.

Treatment.—The pulp in the left central, which was exposed, was carefully anesthetized by pressure and removed by the family dentist. The pulp in the right central (not quite exposed) was

removed under nitrous oxid-oxygen anesthesia. As the roots were not fully formed and the apices were large, the patient

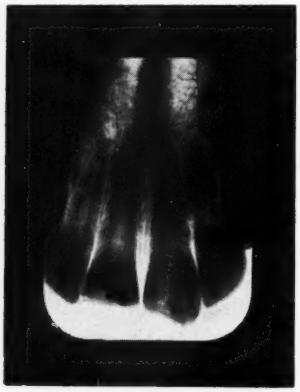


Figure 18.

was referred for the root-filling operation. Radiograph for Fig. 18 was taken after both pulps had been removed. At

Figure 19.

the first sitting, both canals were cleaned with phenolsulphonic acid and eucalyptol compound sealed in. The root-filling operation in the left central was done two days later; in the right central four days after this, when radiograph for Fig. 19 was taken. The root-filling was covered with zinc oxychlorid cement, as is my practice when it may be done, and the patient was referred back to the family dentist with the suggestion that porcelain jacket crowns be made which would not disturb the root-fillings.

Case No. 7. Patient, female; age about 32 years.

This patient had had arthritis in the finger joints and feet. Several teeth had recently been extracted and the general condition was much improved. Among

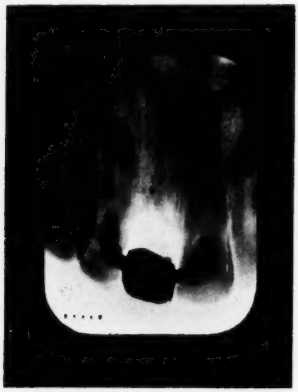


Figure 20.

the teeth extracted was an upper left central. Contrary to the advice and without the knowledge of the oral specialist in whose hands she had been for her previous trouble, the pulps were removed in the right central and left lateral to supply the missing tooth. This work had been done about three months previous to the time the patient was referred. When I first saw the patient, she said that the right central had been "sore" ever since the pulp was removed, and there was every evidence of chronic apical pericementitis. Ordered radiograph, Fig. 20. Five days later, the bridge was removed and I found a pasty material in the canals, the lateral canal being moist and mushy. This material

was partially removed and formocresol sealed in. The following day the canals were cleaned in both teeth with phenolsulphonic acid. A remnant of a partially dead pulp was found in the apical end

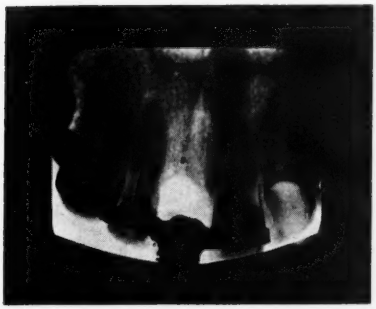


Figure 21.

of the central. With the acid, I worked thru the end of both roots and sealed in eucalyptol compound with diagnostic wires, Fig. 21. Both teeth became very responsive to pressure. The pain was

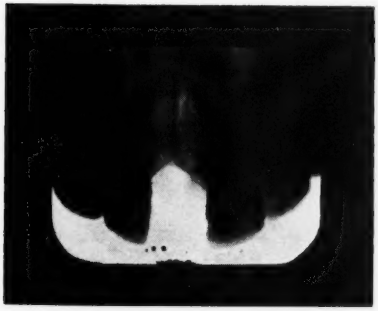


Figure 22.

allayed by having patient use dental liniment freely and prescribing pyramidon in 5 gr. doses, with the instruction to take one tablet every hour until three were taken or pain relieved. Patient returned to the city after nine days, when all pericemental trouble had subsided. The canals were found to be in excellent condition and root-filling operation was done on this date, when radiograph for Fig. 22 was taken. The teeth are perfectly comfortable and the systemic trouble is practically relieved, tho only a short time has elapsed.

Case No. 8. Patient, female; age about 32 years.

Had suffered from asthma for a number of years. The radiograph disclosed a non-purulent dental granuloma on an upper bicuspid and several imperfectly filled canals in other pulpless teeth. It was thought that the dental trouble might have a causative relation to the systemic disease. The granuloma was

Figure 23.

treated in the usual way. Radiograph for Fig. 23 was taken just before treatment. Radiograph for Fig. 24 was taken on the day when the root-filling operation was done; and radiograph for Fig. 25 was taken only two months after root-filling operation and shows that bone regeneration is progressing nicely.

In this case I will only detail the treatment of two of the other teeth as the canal of one was occluded with secondary dentin.

Treatment.—The radiograph for Fig. 26 was taken before treatment, and shows no root-filling in the bicuspid which seems to be, and later found to be, occluded; and only one canal filled in the 3rd molar. The pulps in both teeth had been removed about four months previous and an inlay bridge inserted. On

removing the cement in the bicuspid canal, no opening could be located. Phenolsulphonic acid was placed and left for two or three minutes, when, with a

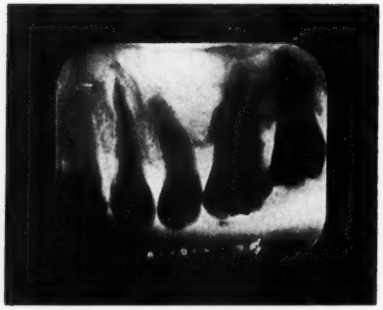


Figure 24.

stiff twist broach, I was able to find a small opening. By keeping plenty of acid at the end of the broach, I soon carefully twisted my way to the end of the root, when the enlarging of the canal was an easy matter. After this the tooth was treated in the usual manner. With xylol the gutta percha root-filling in the one canal in the third molar was removed, and with phenolsulphonic acid another unfilled canal was located; both of which were treated and subsequently filled. Radiograph for

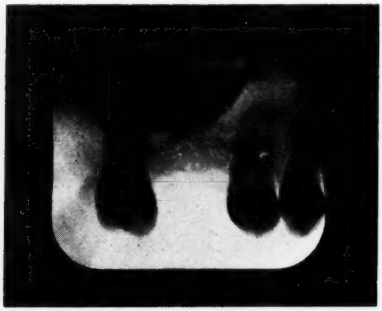


Figure 26.

Fig. 27 was taken three days after the root-filling operation on both teeth.

In this series of cases, I have covered

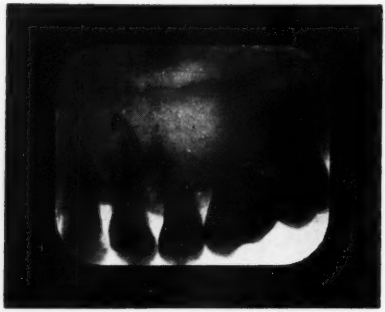


Figure 25.

Figure 27.

almost every variety of conditions associated with pulpless teeth and their treatment, and am willing to let the radiographs speak for themselves. I will close by thanking you for your kind attention.

A STUDY OF THE EFFICIENCY OF DISINFECTANTS AND OF IONIZATION IN ROOT CANALS OF INFECTED TEETH.

By B. E. Dahlgren, D. M. D., Associate Professor of Theory and Practice, College of Dentistry, University of Minnesota.

THE importance of sterilizing infected root canals before filling them is recognized by everyone, but in a preceding paper I have pointed out that this is not always accomplished by our treatment. At the same time I have entertained the optimistic working theory that a thoroly reliable method of root canal treatment might be evolved which would eliminate the otherwise rather pointed need for a bacteriological test for sterility in the case of all presumably disinfected canals which we desire to fill. It seems evident that we are sealing up canals the best we can without any knowledge of the real bacterial condition of the root, and this particularly because we lack dependable information of what is to be expected in the way of bactericidal performance on the part of the agents which we employ.

We have, to be sure, the phenol index, repeatedly ascertained for nearly all known disinfecting substances, but for our needs it is necessary to have definitive information of the action of our disinfecting agents as applied specifically to the purpose for which we wish to use them.

Dental literature contains an abundance of recommendations pertaining to the selection of disinfecting substances and their combinations for use in canals but as far as I can discover there have been very few genuine inquiries made in this field. Blessing has made studies both *in vitro* and *in vivo* of the disinfecting value of a number of agents in favor with the dental profession in Germany, viz., "Phobrol" (a proprietary cresol preparation), thymol alcohol (70:100, saturated solution) and aqua regia, which three he places in the first rank, "Pulpakavol" (a proprietary combination of chlorphenol, thymol and camphor), Antiformin, best known to the clinical bacteriologist as a useful reagent in the detection of tubercle bacilli, Perugen, a Peru balsam preparation, also tricresol—formalin, all of which he places in the second rank, as less effective. Boennecken's experiments along this line covered a larger range of disinfectants which he tested in putrescent teeth, with the following results; thymol-alcohol, chlorphenol, aqua regia and formalin about equivalent and of high rank, then in order of efficiency, tricresol-formalin, sodium hydrate, potassium hydrate, phenol, chloral hydrate, balsam of Peru, Antiformin and Eugenol.

For comparison, Blessing's and Boennecken's results are arranged below in parallel tables.

BOENNECKEN	BLESSING
Thymol-alcohol	Phobrol
Chlorphenol	Thymol—alcohol
Aqua regia	Aqua regia
Formalin	
Tricres.—formal	Pulpakavol
Sodium hydrate	Antiformin
Potass. hydrate	Tricres.—formalin
Phenol	Perugen
Chloral hydrate	
Peru balsam	
Antiformin	
Eugenol	

Both of these investigators agree in placing a very high value on thymol-alcohol, a remarkable conclusion if correct and well worth noting. Both include in the group of first rank acqua regia, to the use of which there would seem to be certain

well defined objections. The same probably applies to formalin. They also agree in placing tricresol—formalin in the second rank and in rating Antiformin and Peru balsam rather low, which would seem entirely reasonable. For the rest, they do not deal with the same substances, tho chlorphenol is an ingredient of Pulpakavol. Phobrol, which Blessing places first of all, is not mentioned by Boennecken. A study of the composite results for the purpose of practical application would clearly indicate thymol-alcohol and aqua regia.

As neither of them includes certain agents which are in rather general use among us, such as creasote and iodine, since they both refuse to tricresol-formalin the high esteem which this combination generally enjoys, as I felt that the so-called ionization should be tested out and colloidal suspensions of the metals which have been suggested lately, etc., I decided to initiate a series of experiments, partly in verification of Blessing's and Boennecken's results, partly to carry the matter still further. It was also hoped that it might prove possible to find some manner of indicating definitely, as in the phenol index, the relative efficiency of the various agents in root canal disinfection or sterilization. Once this were accomplished it would be possible to test out definitely a single agent, for instance a new one, without also carrying on a multitude of tests with a number of others in order to assign the new one a place. It seemed to me that such a mathematical expression of efficiency in root canal disinfection should differ perhaps materially from the phenol index of the substances in question in as much as it should be expressive of the action of the germicidal agents in sterilizing not only canal contents but the dentinal walls and substance of the tooth. The diffusibility and penetrating power would here be factors entering to modify the phenol index. It will be seen that finally the very simple expedient of rating the agents tested in reference to an ideal performance of 100% was adopted.

It was decided to make a beginning with formalin, formalin-tricresol, creasote, creasote and iodine, tincture of iodine, iodine in an aqueous solution of potassium iodide, Dr. Grove's chloral hydrate and thymol combination, chloral hydrate alone, and thymol in the form of thymol-alcohol, chlorphenol (paramono-chlorphenol), phenol, chlorphenol-thymol as in "Pulpakavol," eucalyptol, iodoform, and for subsequent comparison with colloidal metals, a 1:1000 copper sulphate solution, also "ionization" with zinc ions. Phobrol (a solution of chlormetacresol in ricinoleic acid) could at the time not be obtained in the United States.

Three hundred freshly extracted teeth were selected from at least twice that number which had been dropped into normal saline solution immediately on extraction. They were cleaned as soon as possible and opened, the contents of the pulpchamber and canals removed when present. Three hundred were as many as could conveniently be handled at one time. They were stopped with cotton and sterilized in the autoclave. Each tooth was then picked up with flamed tweezers and the root portion dipped in hot paraffin to above the gingival line, after which the teeth were set in bars of plaster, ten teeth to a bar. The teeth were thus isolated from the plaster in which they were set for convenience in handling. Two such bars, twenty teeth, were used for testing each disinfecting agent. Two bars were set aside for control. The plaster bars with the teeth were thruout the experiment kept at body temperature in an incubator which was converted into a moist chamber.

Beginning then with sterilized teeth, all were infected alike with a culture in saliva of bacteria from putrescent canals, but first bloodserum (obtained by centrifuging rabbits blood) was introduced into the canals of each tooth by

means of a fine pipette. The infection with this heavily bacteria-laden saliva was repeated after a week and saliva and broth were supplied to the canals several times and the incubation allowed to progress for about three weeks. It was considered that this treatment should render all infected alike and as thoroly infected as possible and that it should simulate actual conditions of infection in the mouth. Tests at the end of this time showed a very heavy infection with apparently all forms present which had been in the original culture. As far as could be judged from the examination of smears, there seemed to be no change even in the relative prevalence of recognizable forms.

The "treatment" was then carried out much as usual with putrescent teeth using, of course, only a single disinfecting substance for each set of twenty teeth. The canals were entered with broaches, a certain amount of mechanical cleaning was effected, the pulp-chamber and canals were flooded with the respective disinfecting agent and finally a dressing of the same substance on cotton fibres placed in each canal and the tooth stopped with sandarach varnish on cotton. The teeth were then returned to the incubator for forty-eight hours, after which the treatment was repeated with more thoro cleaning of the canals with sterile broaches. Again the pulp chamber and canals were flooded with the same agent, dressings placed and the teeth sealed and returned to the incubator for about forty-eight hours.

The canal dressings were then removed and the teeth stoppered with sterile cotton pellets and once more returned to the incubator for forty-eight hours in order to give some time for the dissipation of the more persistant agents, such as creasote.

The tests for sterility were then performed. These were carried out on one-half of the teeth by placing in the canals, under strict aseptic precautions, sterile canal points (obtained by cutting the tips of J&J canal points and resterilizing) which were soaked in broth, plugging the teeth again with sterile cotton pellets and returning them to the incubator. After forty-eight hours the points were removed with fine flamed tweezers or sterile broaches and dropped into broth. The other half of the teeth were tested more directly by taking from the canals small shavings with sterile flexible reamers or twist broaches. The samples thus obtained were then dropped or floated off into broth. In all cases, in both sets of tests, the entrance to the canals was first sterilized with a hot instrument as it was desired always to test the canals, not the pulp chamber.

The former method seemed the more thoro if the more risky, giving greater opportunity for accidental contamination, but in practice proved to give results apparently just like those obtained by the second. The result of the tests are tabulated below.

RELATIVE EFFICIENCY OF AGENTS USED IN STERILIZATION OF ROOT CANALS OF INFECTED TEETH—AS MEASURED BY TWO TREATMENTS OF FORTY-EIGHT HOURS EACH.

Formalin	0	0	*	0	0	0	0	0	0	0	0	0	*	0	0	0	0	0	90%
Iodine tinct.	*	*	0	*	0	0	0	0	*	0	0	0	0	0	*	0	0	0	70%
Chlorphenol	0	0	0	0	0	0	*	0	0	0	*	*	0	*	0	0	*	0	70%
Form.—Tricres.	0	0	*	0	0	*	0	0	0	0	0	0	*	0	0	*	*	*	70%
Iodine Creasote	0	0	0	0	0	*	*	*	*	0	0	0	0	0	*	0	0	*	70%
Iodine aqu. KI	0	0	0	0	*	*	0	0	*	0	0	*	0	0	0	*	*	*	65%
Phenol	0	0	0	0	*	0	*	0	0	0	*	0	0	0	*	*	*	*	65%
Chloral hydrate	0	*	*	0	0	0	0	*	0	0	*	0	0	*	0	0	*	0	60%
Eucalyptol	*	0	0	0	*	0	0	0	0	0	*	*	*	*	0	0	*	0	60%
Chloral hydr. thym.	0	*	*	0	0	*	*	*	*	0	*	0	0	0	*	0	*	0	55%
Chlorphenol thymol	*	*	0	*	0	*	0	*	*	*	0	0	0	0	0	*	0	*	45%
Creasote	*	0	*	*	*	*	*	*	*	*	0	0	0	*	0	*	*	*	30%
Thymol alcohol	*	*	*	*	*	*	*	*	*	*	*	*	0	*	*	0	0	0	20%
Copper sulphate	0	*	*	0	*	0	*	0	0	*									50%
Iodoform	0	*	*	*	0	*	*	*	*	*									20%

The percentages in the last column were obtained by simply assigning, on the basis of twenty tests, to each test a value of five points, and in the last two instances correspondingly more in the case of a lesser number of tests.

An examination of the above table shows that formalin full strength, as could be expected, outranks all other disinfectants tried, but that even this failed in two out of twenty instances to give sterility. Formalin—tricresol. chlorphenol, tincture of iodine, and iodine—creasote each produced sterility in 70% of the teeth in which they were tried: iodine in an aqueous potassium iodide solution and phenol full strength (or about 95%) follow with 65%. Creasote by itself makes a very poor showing, 30%, which if correct would make it appear that the high efficiency of the iodine-creasote combination must be due more to the iodine than to the creasote. That in such case the latter should be considered a most excellent vehicle, there can be no question. Thymol-alcohol (70:100), from which according to Blessing and Boennecken so much was to be expected, failed utterly to produce any notable results. With its 20% of sterilizing efficiency it is exactly on par with iodoform in this respect. The iodoform was packed into the canals. The action of Groves' chloral hydrate-thymol must be ascribed mostly to the first named component which gave 60% of sterility as compared with the 55% on part of its combination with thymol and the same holds true of the chlorphenol-thymol combination, efficiency 45% to the 70% of chlorphenol alone. There seems to be no doubt that the German "Pulpakavol owes its action chiefly to its chlorphenol ingredient which is somewhat superior to phenol in germicidal power but otherwise resembles it in action and behavior in nearly every way.

Since none of the agents tested proved to give the desired one hundred per cent of sterilization, the only one which approached it in two treatments being formalin in its objectionable, full strength, it was decided to test the effect of an additional, third, treatment in the teeth still left infected, employing, of course, the same agents in the respective teeth. It was obviously unnecessary to place a third treatment in the teeth which had already given a negative test. They were simply counted as such and the figures after three treatments stand as follows:

Formalin	95%	Iodine in KI	85%
Iodine, tinct.	95%	Phenol	95%
Chlorphenol	95%	Chloral hydrate	75%
Formalin-tricres	95%	Eucalyptol	75%
Iodine-creasote	90%	Thymol	20%

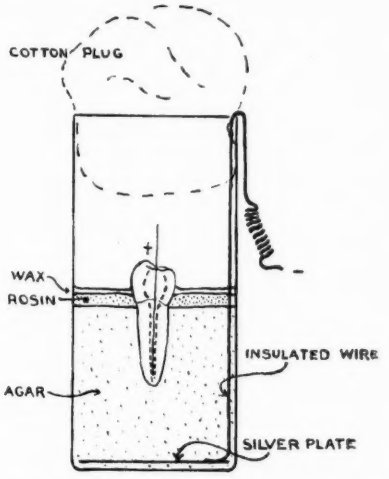
It is seen from the above that even three treatments did not accomplish sterilization of all the teeth in any group. Tincture of iodine, chlorphenol and formalin-tricresol have gained a rank along with formalin at the head of the list and so has phenol, the other iodine preparations following closely. Slight gains were made by chloral hydrate and eucalyptol. Thymol stands as before at the foot of the column. Only those agents which came up to the 60% mark after two treatments were tested with three, excepting thymol and this for the special reason mentioned above.

If the experiments were repeated on a larger scale the figures might stand somewhat differently. The employment of a pure culture of a single organism, e. g., Staphylococcus aureus, the most resistant of the bacteria with which we have to deal, would be much more satisfactory than the use of a mixed culture that makes it practically impossible to recognize contaminations.

In a series of subsequent tests of ionization a pure Staphylococcus culture was employed. These latter experiments as far as they go have covered only the sterilizing effect obtained by using a zinc point as the positive pole with a normal salt solution in the canal.

The experiment was arranged by placing sterilized and opened teeth, stop-

pered with cotton, in agar up to the gingival line. Shell-vials of rather large diameter were used to contain the agar and into the bottom of each of these a silver plate was placed to which had been soldered an insulated wire reaching outside of the vial. On top of the agar a thin layer of rosin was poured to hold the tooth rigid in its position, an important matter if the experiment was to be a success. To effect a tight closure it was found expedient to pour on top of the rosin a thin layer of wax. The vial was as a matter of course kept stoppered with a cotton plug.



The teeth placed in the vials as shown in the figure, the canals were supplied with serum as in the previous experiments with disinfectants, inocculated with a broth culture of Staphylococcus and left in the incubator for about a week. After this they were opened, the top of the tooth and the pulp chamber wiped off with formalin, the entrance to the canals sterilized with a heated instrument and the "ionization" carried out, a current of 4 m. a. being passed for 15 and 20 minutes respectively on two successive days. The canals were then tested by taking small samples with a sterile reamer. The tests were all positive and I can only conclude at the present time that ionization carried out as above described with salt solution and a zinc point is useless as a means of sterilizing canals. The use of a zinc chloride solution for this purpose was not tried but the result would no doubt be more favorable since in addition to any effect of zinc ions the direct germicidal effect of this chemical would be obtained. It was in order to avoid this, and to verify the experiments of Lehman and Zierler and of Sommer, that the salt solution was preferred for the first set of tests.

Before these preliminary results can be considered to have any general validity they should be subjected to verification by repetition with a pure culture of a single organism. The list of agents tried should be increased. Chlor-metecresol, Schreier's metallic sodium and potassium, Sodium or potassium hydrate, the acids in common use, iodine and the metals in collodial form, etc., might be tested, also the various important agents in different dilutions. The effect of the combination of measures usually employed in root canal treatment should be tested in the same way, e. g. washing with hydrogen peroxide followed by treatment with a germicidal agent as a canal dressing, renewed washing with hydrogen peroxide, drying with alcohol, etc.

The most significant single result of the experiments, aside from the failure to achieve complete sterilization even with the most powerful agents tried, seems to me to be the relatively high efficiency of iodine in different solutions. A study of its action on the apical and the peridental tissues would be of great interest. Studies of the effect of sterilizing agents on the tissues of attachment of the tooth may absolutely contraindicate some of the most efficient agents available and may compel the use of others only in very great dilutions. Such experiments should be performed, but it would seem to be reasonable to

defer the time consuming and extensive series of animal experiments necessary to this end until a real knowledge of the disinfecting qualities of the substances at our disposal has first been gained and the ground thereby cleared. It would, e. g. be of little avail to ascertain the effect on the apical tissues of an agent whose sterilizing efficiency is only 30-50% when there are several that approach the desirable 100% of bactericidal power. Only if these should be contraindicated would it be necessary to test out the less efficient ones.

It is hoped that the above account of experiments may stimulate others to undertake independent sets of such tests, the point of the whole matter being that when the effect of our root canal treatment becomes a matter of knowledge rather than of guesswork we shall be able to act more intelligently in this most important phase of our work.

Acknowledgement is due to the hearty co-operation of the faculty of the University of Minnesota in the above work as well as to Messrs. H. Holiday and E. C. West, student assistants.

LITERATURE.

Boennecken, H., Untersuchungen über einige neueren bei der Wurzelbehandlung verwandte Antiseptika, Oesterr. Zeitschr. f. Stomatol., 1913, 3.51.

Blessing, G., Untersuchungen über den antibacteriellen Wert einige bei der Therapie der Pulpagangran gebrauchlichen Mittel. Deutsch. Monatschr. f. Zahnheilk., 1914, p. 763.

Grove, C. J., Dental Review, 1913, p. 1004.

Lehmann u. Zierler, Untersuch über die Abtötung von Bakterien durch Schwache, therapeutisch verwertbare Ströme. Archiv. f. Hygiene XLVI s. 221.

Zierler, Beiträge zur Behand tung putrider Zahnwurzelu, etc.—Würzburg 1905.

Sommer, K., Experimentello Untersuchungen über Electro-sterilization gangränöser wurzeln.—D. M. f. Z. 1913. s. 315.

THE PRESENT STANDING OF ELECTROLYTIC MEDICATION WITH A DISCUSSION OF A FEW BASAL PRINCIPLES THEREIN APPLIED.

By George T. Fette, Ph. D., A. M., D. D. S., Cincinnati, Ohio.
Professor of Chemistry and Materia Medica, Ohio College of Dental Surgery.

IN VIEW of the numerous testimonials which so favorably bespeak the gratifying results of ionic medication by means of the galvanic current, it is almost impossible to account for the general hesitancy on the part of the dental profession in grasping after this phase of the healing art. We may probably assign both subjective and objective causes for this determent. If a knowledge of all the fundamentals of the theories involved in electrolytic medication were necessary as a prerequisite, the generality of the profession could not adopt this mode of medication; hence the prevailing hesitancy—and with sufficient reason, because not only college men, but even university professors who make this study their life work, are strained to grasp the subject in its entirety. The above assertion may be safely granted, when we consider the newness of the ionization theory, which was so reluctantly accepted at first, and when we add to this, that the ionization theory, itself, postulates other theories which were looked upon with equal suspicion, chief among which is the osmotic pressure. Briefly, complete mastery would require a thoro knowledge of physical chemistry, as reconstructed upon the discovery of Arrhenius (1889) and comprising the valuable works of Faraday, Pfeffer, Van't Hoff, Hittorf, Kohlrausch, and others. In addition to this, the practitioner should possess a working knowledge of the physics of electricity, and a rational conception of the pharmacological action of the ions of the electrolytes which he would employ as his remedial agents, i. e., a clear conception of drugs in the sense, as outlined by Kronig, Paul, and a few others.

While this insufficiency of information, thus outlined, deters the dentist in the main, we believe we err not grossly when we put forth the claim that he is objectively barred to a certain extent by a want of proper literature—or, more correctly, perhaps—by the lack of a succinct and at the same time, sufficiently complete and accurate exposition of the subject. The writer is impelled to this statement by the prevalent misconception, "that ionization is a production of the current."

When we try to ascertain the general understanding among the profession of ionization, we find that it is most commonly confounded with what we properly term, electrolysis. Where this misconception does not obtain from personal impression, it is casually gleaned from extant literature upon the subject, as is evidenced by the following quotations:

"An example of the movements of ions is furnished when the current is passed thru a solution of zinc chlorid between two poles and ZnC12 is split or dissociated into the cation Zn which becomes positively charged and moves towards the negative pole, and the anion Cl2

which becomes negatively charged and moves towards the positive pole."—(Prinz-Sturridge[1]).

"The ion itself may be an invisible product of electrolysis." (Sturridge[2]).

"* * * * the passing of a galvanic current thru the body is regarded as productive of ions * * *." (Ibid).

"This is what is known now as ions of the metals which are dissolved by the action of the current." (Ibid).

"* * * good results were invariably obtained with simple salts from which ions of an antiseptic nature were readily formed by a low current strength." (Ibid).

"All substances are not dissociated by the effect of the current." (Ibid).

From these introductory remarks, it would appear that the question of so-called ionic medication assumes a status which, while in same measure extremely deplorable, is not altogether inexcusable. The indulgent reader will agree with the writer that some remedial impetus is wanting, which, if effectively introduced, would soon banish all the lack of attention to this phase of medication among the American dentists. It is no secret fact, that a number of American dentists are working in this direction in several localities of our country, who have never given publicity to their individual efforts and successes. What an advancement would be accomplished if these individual workers were to meet in convention to discuss basal principles, to fix a terminology, and to adopt such standards of procedure as would result in a perfect and reliable technic! An expeditious response on the part of the profession could scarcely be doubted, since the American dentist is quite alert to professional betterment and lacks no personal effort in its attainment. A united effort on the plan thus proposed to bring electrolytic medication into prominence in America would be a realization of a fond hope, but, in the sequel, the writer desires to present his positive views regarding a few theoretical principles as applied in the present standing of the science.

As an initiatory, what can be said about the name of that branch of medication which we effect by means of the galvanic current? At present, it is called "ionic medication." Is the name appropriate? By convention, perhaps, it has come to assume the meaning, but, in strictness, it does not express the essence of the process. The writer would suggest that the term "electrolytic" be substituted for that of "ionic," for reasons which are too apparent to be passed by. We have ionic medication in the absence of all electric current when, for instance, we seal zinc chlorid in the root of a tooth for antiseptic purpose. We know that the dissociated zinc (i. e., the zinc ion) of the compound possesses the antiseptic property primarily, and not the dissociated chlorin, for, otherwise, any indefinite chlorid could be employed. If, then, the zinc ion sterilizes the root canal specifically, in as far as it is in the ionic condition, we certainly have ionic medication, altho we never applied the current. Consequently, we include in the term "ionic medication" more than we really express.

Dr. Tousey[3] avoids this difficulty by using the expression, "ionic medication by electrolysis." In selecting the term, "electrolytic," we introduce nothing new, but simply employ the nomenclature of Faraday (1835), the discoverer of the **laws of electro-chemical change,** who called the process of conduction of electricity by an electrolyte by the name, **electrolysis.**[4]

Now, since the medication under discussion depends primarily on the movement of particles (the ions) of ponderable matter, and this movement is essentially the conduction of electricity, it is appar-

[1]Herman Prinz, Dental Materia Medica and Therapeutics, C. V. Mosby Co., St. Louis, Mo., 1916.

[2]Ernest Sturridge, Dental Electro-Therapeutics.—Lea & Febiger, New York, 1914.]

[3]Sinclair Tousey—Medical Electricity, W. B. Saunders Co., 1915.

[4]LeBlanc—Text-book of Electro-Chemistry. The McMillan Co., 1913.

ent that no better name could possibly be employed than the term, "electrolytic."

The several citations given in our introductory bear sufficient evidence that production of ions by the electric current is an accepted fact, even in current literature. While among the misinformed the impression is that ionization straightway results by the passage of the current, the authors of the above quotations, however, have a clear conception of ionization, apart from the electric current and, indeed, in the true sense of the electrolytic dissociation theory, but they simply maintain that ions, either alone, or in addition to present ions from the electrolyte employed, can be formed from what they call the sensitive, soluble, or oxydizable electrodes, by the passage of the galvanic current. In other words, they hold that **an immediate production of ions by the current** is possible. Sinclair Tousey, under the heading, "Distinction Between Electric Ionic Medication and Other Ionic Medication," gives expression to the above conviction in the following terms: "Dissolving any substance produces a certain number of ions of that substance and it is probable that all medication depends chiefly upon these active particles of the different substances. Electric ionic medication is the production of ions and their introduction into the body by means of an electric current." Now, the claim that ions are formed by the current must be founded in some phenomenon as in a foundation. If the explanation of the phenomenon is misleading, we simply have a case of misconception of the phenomenon. The phenomenon, whereby the production of ions by the current is explained in the above sense, is commonly exhibited by the following interesting experiment. Elementary, or free, iron is employed as the anode, which sends off ferrous ions into the surrounding moist, or liquid, medium. Now, as we know from analytical chemistry, ferrous ions in the presence of potassium ferricyanide (which, of course, is mixed with the medium) produces the characteristic blue, which naturally stains the medium in question. If metallic copper be used as the anode, cupric ions will be given off, which have a color of their own and would stain the surrounding medium a light green. Sturridge[5], in his experiment employs both metals and uses moist albumin as the surrounding medium. That certain ions appear, and that they come from the substance of the electrodes (anodes) employed, and that they are introduced into the body of the albumin by the electric current cannot be denied. But all these circumstances do not demonstrate that they (the ions) are produced by the current. At this point, we must not fail to cite one authority, who does not accord with the above view, namely, Lewis Jones[6], who also performs the above experiment, but uses, instead of albumin, moistened parchment paper folded to a thickness of eighteen layers. This authority explains the phenomenon in question as a secondary reaction, as can be best shown in his own words: "Another form of secondary reaction is a reaction in which the metal of the anode is concerned. If the anode is a metal such as zinc or copper, which can readily form ions, and if the electrolyte be one containing anions such as Cl or SO_4, which can combine with zinc or copper to form compounds such as $ZnCl_2$, or $CuSO_4$, then the SO_4 combines with the zinc or copper instead of combining with the hydrogen of the solvent, and the metal of the anode goes into solution and hydrogen is not liberated. Zinc or copper ions will move away from the anode, and when either of these metals is used as the anode in an application to a patient, then a salt of the metal will migrate into the moist fabric which lies between the metal and the skin, and will eventually enter the

[5]Sturridge—British Medical Journal, Nov. 2, 1912.

[6]Lewis Jones—Ionic Medication, P. Blakiston's Son & Co., Philadelphia, 1914.

skin and tissues of the patient. If copper were the metal used, the fabric would be stained greenish by the penetration of the cupric ions. If iron were used instead of copper, the fabric would be stained with iron mould." Jones' description, while it does not consider the current as a causative factor directly, fails, nevertheless, to account for the appearance of the iron and copper ions. What, then, is the real cause of the appearance of these ions? We may now give as our positive answer, that the ions in question are due to the **electrolytic solution pressure** of the metals and, in the case of the experiments above, to that of the iron and copper. For this solution of the problem, we are indebted to Prof. Nernst[7], who did not primarily introduce the electrolytic solution pressure to account for the presence of ions, but rather for the establishment of the source of electromotive force. With the ratio of the electrolytic solution pressure (P) to the osmotic pressure (p) of the solution (the moist medium of the above experiment), Nernst was enabled to develop his famous mathematical formula to express the value of electromotive force (E):

$$E = 0.029 \log \frac{P}{p} \text{ volts in the case of a}$$

bivalent metal or $E = \frac{0.058}{n} \log \frac{P}{p}$ volts,

in which n stands for n valence of the metal.]

The scope of this article forbids saying more about the electrolytic solution pressure. For our purpose, it is sufficient to have disproved the statement that the ions in question are produced by the electric current. (Let us briefly note in passing that these very ions appearing around the anode are an indication of an electromotive-force, which acts counterwise to the source of the current and which is known as polarization, which we shall touch upon again.)

Aside from the misconception of ionization by the current, there is another misuse of the term "ionization" (or to ionize) to express the action or effect of ions upon the various tissues which we wish to treat. This misuse is apparent from the following quotations:

"The therapeutic effect of the ions * * * * must be determined in the selection of the drug for ionization." Ionization with Anions." (Prinz-Sturridge).

"Needles of zinc and copper are also used sometimes to pierce the part to be ionized." "Caré has described the following method for preparing sounds for the ionization of fistula, urethrites, etc." (L. Jones).

"Zinc ionization for Epithelioma." Salicylic ionization in acute Rheumatism." "Lithium ionization in Gout." (Tousey).

"Copper electrodes are often used by the author for the ionization of fistulous tracts * * *" "The effect is, in case of ionization with an antiseptic ion* * * *." (Sturridge).

Now we all understand that neither the purpose nor the intention exists to ionize (or convert into ions) the tissues in question, since, all that concerns us, is simply the therapeutic effect of the ions of our drugs. According to the foregoing an expression like "ionization apparatus," for instance, would be misleading.

It being understood that electrolytic medication consists essentially in the application of drugs which in the ionic form are carried into the tissues by a continuous electric current, the question may now be asked, what particular phase of the physics of electricity should chiefly occupy the practitioner's attention. This particular phase is the exceedingly important question of **electrical energy**, without a real conception of which, electrolytic medication can never stand out as a true science. We must conceive electricity as an **energy**, like we do heat, light, work, etc., if we would understand the essence of electrical phenomena. The failure in our current literature to

[7]W. Nernst—Ztschr. Phys. Chem. 4, 129 (1889).

consider electricity as an energy, is probably the chief cause of the discrepency among our authorities on the point of voltage or amperage to the employed. While each of the authorities recommend a certain suitable current, or amperage, they all seem to show some uncertainty as to the electromotive force to be employed, as tho this were a matter of choice, to be worked out by practice. Naturally, as we know, a certain current passed thru the body will, in a measure, determine the voltage, because the patient will just tolerate a certain dosage, or "pain limit," as it is called by some writers. Now, neither current, nor electro-motive force, separately, constitutes electrical energy, but if we take the product of these two factors, current and electromotive force, we arrive at the definition of electrical energy. When Faraday first introduced his second law of electro-chemical change, he met with great opposition and even Berzelins failed to correctly understand the meaning of that law, because he considered it to state that **equal quantity of electrical energy** were necessary to decompose **equal chemical equivalents** of different substances. Whether or not Faraday, himself, had a clear conception of **electrical energy,** his law, however, states concisely that **equal quantity of electricity,** and not **equal quantity of electrical energy**, is required to separate equal chemically equivalent quantity of the substances. By quantity of electricity, of course, is meant the quantity of current, and Faraday's law is validly applicable without the conception of electrical energy, because the decomposition is directly proportional to the current. (Of course, a certain decomposition voltage is necessary, because, without it no current would flow, and Faraday's law would have no purpose. Faraday's law, being particularly concerned in electrolytic work, has, naturally, gained prime attention, even at the full neglect of the electro-motive force. Le Blanc says: "The factors of an energy are still often mistaken for the energy itself." The current is only a factor of electrical energy, while the electromotive force (voltage or potential) is the other. Expressed in formula, then:

Electrical Energy (E) = Electro-motive force (V) x current (C), or E = V x C.

As in the case of all forms of energy, we have two factors which are designated by special names, viz, the **intensity** factor, which generally determines the equilibrium in a system, and the **capacity** factor, which has reference to quantity. Note what Prof. William Ostwald[8] says on the factors of electrical energy—"Like the other forms of energy, electrical energy appears as the product of two factors, one of which is called **quantity** of electricity, the other, **potential tension,** or **electro-motive force.** The first factor is a capacity, the second an intensity, so that electrical energy can only assume a permanent stable state when the second magnitude is the same thruout the system. When this is not the case, a change of state occurs from which work may be obtained, just as it can be got from change of state of heat or of any other form of energy. The other factor, the quantity of electricity, is usually looked upon as being the real existent **thing** that lies at the bottom of all electrical phenomena, and the whole nomenclature of electrical science has been formed in accordance with this conception, altho the view has often been found very convenient, it must still be borne in mind that the **thing** underlying electrical phenomena is **electrical energy,** and that the nomenclature usually adopted is only of value as affording us, in many cases, a means of clear and concise formulation."

Now, "the real existent **thing** that lies at the bottom of all electrical phenomena," namely electrical energy (the product V x C) constitutes the dosage above hinted at, because it represents the ac-

[8]Wm. Ostwald—Outlines of General Chemistry. MacMillan & Co., London, 1912.

tual amount of work performed upon the tissues. If this be true, then it is quite optional in which way we regulate the individual factor for the sake of serving other desirable purposes, as long as we conserve the energy. We know from Faraday's law that the greater the quantity of current (in coulombs) is, the greater will also be the quantity of ions which will migrate into the tissues. Consequently, by reducing the voltage, we can correspondingly increase the current with the resultant greater movement of ions, without altering the electrical energy numerically, i. e., without hurting the patient by overcharging. We may adopt the voltage as small as we choose, providing we observe the limits of the decomposition voltages of the substances around the electrodes. A numerical example may elucidate our contention. Suppose we ascertained the maximum dose of electrical energy for a certain patient is .00486 Joule (1 volt-coulomb), and suppose, furthermore, we employed zinc chlorid as our medicinal electrolyte, whose decomposition voltage is 2.18 volts (+ 0.49 — (— 1.69))*. [To simplify matters, we assume that the electrolyte† (i. e., $ZnCl_2$) is used at the so-called inactive electrode, the complex electrolyte of the body intervening, being neglected, since this would not introduce any error, and, since, more over, the conception of the migration of the ions is not identical with that of their neutralization at the electrodes.] Then, by solving the above equation, E=VxC for C, and substituting, we obtain:

$$C = \frac{E}{V} = \frac{.00486}{2.18} = .00225 \text{ ampere, or}$$

2.25 milliamperes. Now, if we were to employ 8.72 volts—four times the voltage of the above example—we would have the following results:

$$C = \frac{E}{V} = \frac{.00486}{8.72} .000557 \text{ ampere, or}$$

.557 milliampere. From these two examples, we learn that for the same electrical energy expended upon the patient, we obtain 2.25 milliamperes in the first case, and .557 milliampere in the second, which is four times less than the first example. Again, if we were to employ zinc iodide (ZnI_2), instead of zinc chlorid —it being understood that we are here concerned with the antiseptic ion Zn, and that it is immaterial from what compound we obtain it as long as the anion does not become objectionable—we could reduce the voltage still more, because the decomposition voltage of ZnI_2 is only 1.29 volts (+ 0.49 — (—80)). Calculating the current, as above, we obtain:

$$C = \frac{E}{V} = \frac{.00486}{1.29} = .0037 \text{ ampere, or}$$

3.7 milliamperes—six times as much as in the last example. The indulgent reader will note that we have not taken any cognizance of Ohm's law in our above discussion, and if we treat the subject strictly the conception of resistance does not enter into consideration, because, as LeBlanc says, "quantity of energy is independent of the time and because the resistance only determines the time required for the fall to take place." In conformity with what has just been said, an "electrolytical posology"—if the writer may thus introduce the term—could be elaborated with a complete neglect of the resistance (?) of the various parts of the body. By employing a certain voltage—say of two volts—and enclosing a standard milliampere meter in circuit with any part of the body, we could read off the current directly. We would thus have both the intensity factor (V) and the capacity factor ($\frac{C \text{ ma}}{1000}$) of the electri-

*This value is taken from Alex. Smith—Introduction to Inorganic Chemistry. Century Co., 1909.

†The usual saline solution, sodium chlorid, has a decomposition voltage of 4.23 volts.

cal energy impressed upon the part of the body in question. The calculation would be simple, viz:

$$V \times \frac{C \text{ in Milliamperes}}{1000} = E]$$

While, upon the question of the resistance of the body, the writer would briefly criticize the manner in which this subject is treated in our usual text books.

We should not speak of resistance at all. The proper designation is conductance (or conductivity), which is the reciprocal of the resistance. Resistance is used in speaking of conductors of the first class, such as the metals, while **conductance** is applied to conductors of the second class, namely, the electrolytes, of which the human body is a representative. The measurement of the **conductance** in reciprocal ohms $\left(\frac{1}{\text{ohm}}\right)$ of electrolytes is essentially different from that of the ohms in the conductors of the first class, for which discovery, as also for the method of measurement, we are greatly indebted to Kohlrausch. Kohlrausch (1880) introduced the alternating current in connection with the Whetstone Bridge, for measuring the conductance of electrolytes in order to avoid polarization, which is always produced with the direct current, and which gives inaccurate information. This being true, the information as given in our text books on the resistance of the body and the calculations derived from it must necessarily be misleading.

Resistance, indeed, plays an important role in electrical science, especially in the design of electrical apparatus, in which the heating effect, or the C^2R losses, as it is called, must be carefully considered. The heating effect, being proportional to the resistance, and to the square of the current, can be maintained within certain limits by selecting a compromise between the two factors, i.e., by increasing or decreasing either resistance or current. Applying this consideration, however, to the tissues of the body, we are once limited to the one alternative of varying the current, since the body resistance cannot be changed. If now, furthermore, the claim be correct which has been put forth by some writers, that the pain sensation under the electrical current is a true heat effect which is directly consequent upon the high resistance of the body tissues. then our practice has been validly established in controlling the "pain-limit" by regulating the current, since the resistance in question is an invariable quantity. The logical inference which we might draw from the above consideration, could be reduced to this: the body tissues can bear just a certain amount of heat, hence, in order to keep within that limit, we can only employ the electrical equivalent of that heat. This would be the truth if the body tissues were a real resistance, as that of the conductors of the first-class. We know that, in an electrical circuit where no sort of work is taken off, all electrical energy is converted into its equivalent of heat, and where work is taken off the circuit, the heating effect falls off proportionately. Now, when we pass a current thru the body, a certain amount of electrolytic work is done by the current and that work is not performed upon the tissues, but strictly on the electrode surfaces, which are outside of the body. The movements of the ions of, or in, the body, which transport the current, require no work in the sense of energy to be expended upon them by the current, and the number only of ions present determines the quantity of electricity that will flow. Double the number of ions would transport twice the amount of current, or, conversely, twice the amount of current would require twice the number of ions for its transport. This is in conformity with Faraday's first law. Now, if the last ion had been called into requisition, as it were, no further increase of current flow

could be possible, for the non-electrolytic constituent of the body is a non-conductor, and, as such, could not possibly transport any current, and all question of **resistance** becomes thus excluded. What, then, produces the pain of our patients under the electrical current? Might we not call it an **electrical effect**? No! for we claimed that no work was expended upon the tissues and, besides, we have no sense perception specifically for electricity, except thru its transformed energy, heat, so that the heat theory, in itself, is not incorrect. An explanation could possibly be gleaned from the works of our physical chemists, who speak of "ionic friction," and this probably is the cause of our pain sensation under the electrical current, and not the **resistance** in the sense that it opposes the flow of electricity, like conductors of the first-class.

In conclusion the writer would exhort those members of the profession now practicing electrolytic-medication to turn their attention to, or try out, the application by means of the galvanic current of Dr. Martin H. Fischer's[9] salt solutions in oedematous conditions about the mouth. It is not known to the writer whether or not Fischer's salt solutions have been introduced in this way. Certainly, these solutions, being specifically employed as electrolytes, could be easily introduced into the tissues by the current, especially, since neither cataphoretic, nor anaphoretic transport is intended, but, primarily, only that of either the positive or negative ions of the solution.

The one successful and rapid means of relieving those troublesome swellings about the gums which are so vexing to the dentist, and so painful to the patient, would amply justify the practitioner in familiarizing himself with the principles and technic of electrolytic medication.

[9]Martin H. Fisher—Cedema and Nephritis, John Wiley, Inc., 1915.

"IONIC MEDICATION BY MEANS OF THE ELECTRIC CURRENT."

By George T. Fette, Ph. D., A. M., D. D. S., Cincinnati, Ohio.

(Read before Cincinnati Dental Society, Feb. 16th, 1917.)

Introduction.

AT OUR last month's session the essayist of the evening, Dr. H. H. Schuhmann, of Chicago, presented a very instructive paper in which he set forth his views concerning the relationship between oral infection and systemic diseases. The essayist claimed that we have no scientific proof that there exists a direct relation; and his chief argument was founded upon the fact, that after the infectious foci had been obliterated, the systemic disturbances continued in a majority of cases. As a counter hypothesis to the focal infection theory, Dr. Schuhmann offered as his opinion that these systemic diseases result from lowered vital resistance; which, in turn, may have been directly caused by the infection of the dental organs. This new theory—if we can consider it as such—would do away with the horrors of focal infection, and, in a measure, reduce our responsibility; still, if these focal infections continue to be looked upon as indirect causes of systemic disturbances, then we would fare equally bad under this new hypothesis as we did under the recent focal infection theory. Now, it matters little to which of these two theories we confess ourselves; the focal infection theory has certainly taught us the best lesson of our lives; it has forced us into investigations which demonstrate that we are utterly unable to properly disinfect our root canals, and that our present method of antiseptic treatments are far from being perfect. In view of this almost lamentable fact may we hopefully look for a renaissance of our methods in the future? You will agree with me that if we could succeed in accomplishing two things, namely, absolute disinfection of our root canals and the cure of pyorrhea alveolaris, we would satisfy the ultimate aims of our profession and place ourselves beyond all repute by our medical brethren. Ladies and Gentlemen, I want to assure you in the presentation of my happy topic this evening, that we have a method whereby this can be accomplished, namely, "Ionic Medication by means of the Electric Current."

On the 15th of last November I submitted for publication a contribution in which I set forth some of my views upon the present standing of Electrolytic Medication. Being in hopes that this contribution would be published in February I had premissed in the preparation of this evening's paper, that most of you would have read that article, so that my reading tonight might be looked upon as a supplement to it. In view, now, of this disappointment I shall take the liberty of reading some passages, now and then, from my original contribution in order to present a fairly succinct exposition of my subject.

To treat our subject exhaustively even with the several quotations which I shall make from said contribution would carry us beyond the scope of this paper because the details of Electrolytic Medication comprise basal principles which are

borrowed from three distinct departments of the sciences. First, we should deal with the Physics of Electricity in all its various branches; secondly, we should touch upon a multitude of theories which constitute the foundation of Electro-Chemistry; or more specifically the Physico-Chemistry of ionization and Electrolysis; and thirdly, since Electrolytic Medication is a truly Pharmacological Therapy, we should consider the ionic properties of all these drugs which we would employ in our treatment. You readily see that a compromise must be reached in our selection of material for consideration, which shall be suited to elicit a satisfactory understanding of the entire process in question.

Ionization.

There exists a prevalent misconception among the generality of the profession of confounding Ionization with Electrolysis. The root of this misconception lies in the neglect of carefully distinguishing between an Ionogen and an Electrolyte. In order to avoid this confusion in our minds let us first consider what is strictly understood by Ionization; and then, let us define Electrolysis. Now, in the order of dependence one upon the other, Ionization is a condition pre-requisite to Electrolysis; but in the order of time the phenomenon of Electrolysis was known long before the true conception of Ionization was developed. This is an occurrence which is quite common in the sciences: what ought to be known first in the order of intelligibility, in the succession of discoveries, is found out last.

Let us begin our study of Ionization with an experiment: Exp. 1. I have here a molecular solution of ammonium hydroxide (NH_4OH) dissolved in ethyl alcohol. To this solution is added a little phenolpythalein ($HC_{14}H_9O_4$) which is an indicator for the detection of alkaline solutions. Note the solution shows no color. But if we now add water to the solution a sudden change takes place and a profuse amount of red color is produced which increases with dilution. The absence of the red in the original solution proved to us that the solution was not alkaline and that it became such only upon addition of water.

Exp. 2. I have here a molecular solution in water of copper bromide ($Cu\ Br_2$) which is a dark brown. Note the change in color as I add the water. This (pointed out) is the green stage (Ionization 70 per cent). This (pointed out) is known as the blue stage (Ionization 81 per cent.)

We will now explain the reactions by means of the symbols on the card board:

$$(A)\ (1)\quad NH_4OH \begin{bmatrix}\text{molecular}\\ \text{solution}\end{bmatrix} \rightleftarrows (NH_4)^+ + (OH)^-$$

$$(2)\quad HC_{14}H_9O_4 \begin{bmatrix}\text{molecular}\\ \text{solution}\end{bmatrix} \rightleftarrows (C_{14}H_9O_4)^- + H^+$$

$$(3)\quad H^+ + OH^- \rightarrow H_2O$$

$$(B)\quad Cu\ Br_2[\text{solid}] \rightarrow Cu^{++}\ Br_2[\text{Diss'd}] \rightleftarrows Cu^{++} + 2Br^-.$$

The Ammonium hydroxide molecule is split up into two radicals, viz., $(NH_4)^+$ and $(OH)^-$. The phenolphthalein is also dissociated into two discrete particles $(C_{14}H_9O_4)^-$, and hydrogen $(H)^+$. Now, part of the hydroxidion $(OH)^-$ from the ammonium hydroxide united with the hydrion of the phenolphthalein forming natural water. In propor-

tion as the hydrion (H) was neutralized by the hydroxidion, the other phenolphthalein radical ($C_{14}H_9O_4$) grew into prominence. This radical is the beautiful red which you observed. The copper bromide is a black solid. Upon adding just sufficient water to dissolve it we obtain a molecular solution, which upon addition of more water begins to break up into its component particles, copper-ions and bromin-ions. The copper-ion has a color of its own which gives the color effects which you noticed. These solutions, now, of ammonium hydroxide and copper bromide would conduct the electric current which could be demonstrated upon trial. Before the water was added no electricity could have been passed thru the solution. The conduction of electricity in these cases is explained by the presence of the discrete particles on the one hand of ammonion $(NH_4)^+$ and hydroxidion $(OH)^-$ and on the other hand of cuprion $(Cu)^{++}$ and bromidion $(2Br)^-$ which are respectively charged with positive and negative electricity. These charges exist prior to any passage of the current and have come into existence, in the very act of the molecules dissociating into its particles. It is at this point where the common misconception is engendered of considering these charges as being produced by the current.

With these remarks we are in a position to define Ionization as the phenomenon of a substance dissociating in such a manner that the dissolved particles become carriers of electricity. The etymological derivation of the term "Ionization" is this: Faraday in 1835 introduced the term Ion from the Greek ἰὼν ("going") to designate the dissolved particles which were the parts which moved with the electric current. Now, the formation of such Ions naturally is Ionization. The term Ionization, however, is only a substitute for another expression which was originally introduced by Arrhenius 1887, the first propounder of the Ionic hypothesis; namely, **Electrolytic Dissociation.** This latter expression is more in accord with the essence of the phenomenon which is a dissociation of an electrolytic nature in virtue of its capability of electric conduction. Both expressions, however, are equally well adapted. What significance attaches to this theory of Ionization? In physical chemistry it forms the keystone to its entire structure. To convince oneself of this statement one would only have to examine into the works of Van't Hoff, the discoverer of the dilute solution law; of Pfeffer, the first successful investigator of osmotic pressure; of Hirtoff, the propounder of ionic migration; and of Kohlrausch, the prime authority of electrical conduction; save the mention of all the other investigators, like Faraday, Ostwold, Nernst, etc. In chemistry whether static or dynamic, we find the Ionization theory indispensable as an explanation to most, if not to all, reactive phenomena. In analytical chemistry it constitutes its very foundation as all its reations are those of the Ions. By means of this Ionic conception; for instance, we are enabled today to understand the action of the acids, bases and salts. All acids are capable of dissolving the metals. Some do this rapidly, others require considerable time. Of course, in comparing reactions of this kind it is assumed that equivalent quantities of the acids are taken i. e., the gram equivalent dissolved in the same unit volume of the solvent. In comparing hydrochloric acid, sulphuric acid and acetic acid we find that the ratios of their activity stand respectively as 80, 51 and .4 for deci-normal solutions. Now, since all these acids contain the same amount of hydrogen and since the hydrogen alone is held accountable for the acid reaction (the other radicals of the acid not entering into consideration) why is it that one acid is so much more pow-

erful than the other. It has been scientifically demonstrated that all the acids are variously ionized, i. e., the degree of dissociation is different in the different acids. Thus in the cases above considered hydrochloric acid is ionized 80%, sulphuric acid 51% and acetic acid .4% in a deci-normal solution. Hence, the strength of an acid is directly proportional to its degree of Ionization. Now, the electric conductivity is also directly proportional to this degree of dissociation. Therefore, you readily see that the electric conduction is a measure of the degree of Ionization and consequently also of the chemical value of the substance ionized. We say at infinite dilution all acids would have the same strength because at this dilution all acids would be completely ionized. The process of Ionization may be represented as shown in the following scheme:

(1) $HCl\ [gas] \rightarrow HCl\ [diss'd] \rightleftarrows H^{\cdot} + + Cl'$

(2) $HNO_3\ [liquid] \rightarrow HNO_3\ [diss'd] \rightleftarrows H^{\cdot} + + No'_3$

(3) $Zn\ Cl_2\ [solid] \rightarrow Zn\ Zl_2\ [diss'd] \rightleftarrows Zn'' + + Cl'_2$

(4) $Na\ C_7H_5O_3\ [diss'd] \rightarrow Na\ C_7H_5O_3\ [diss'd] \rightleftarrows Na^{\cdot} + C_7H_5O_3'$

(5) $Na\ Cl\ [solid] \rightarrow Na\ Cl\ [diss'd]\ Na^{\cdot} + + Cl'$

Let us consider a few cases of Ionization in Pharmacology. The antiseptic value of $Zn\ Cl_2$ (3) depends upon the zinc ion. If this be the case, then any zinc salt could be employed for the same purpose. So it can, providing the negative radical exhibits no objectionable features. In sodium salicylate (4) the salicylate radical is regarded as the antiseptic or anti-rheumatic ion. In sodium chloride (5) neither the sodium-ion nor the chlorin-ion would be looked upon as a characteristic antiseptic ion. Sodium chloride is therefore tabulated as a weak antiseptic. These three antiseptics mentioned are such only in the ionized condition, i. e., when they are dissolved in water. In their crystallized or solid state they have no antiseptic properties, —they may even be sterile. In my articles "The Higher Valency of Arsenic" and in "Hydrogen Peroxide" (Dental Cosmos, Nov., 1914, and June, 1915,) I have so arranged my material as to present a concise exposition of the leading principles involved in Ionic Chemistry. To these I would refer for additional information.

At this point I wish to criticise the peculiar usages to which the term "Ionization" is often applied. I read the following from my original article: "When we try to ascertain the general understanding among the profession of ionization, we find that it is most commonly confounded with what we properly term, Electrolysis. Where this misconception does not obtain from personal impression, it is casually gleaned from extant literature upon the subject, as is evidenced by the following quotations:

"An example of the movements of ions is furnished when the current is passed thru a solution of zinc chlorid between two poles and $Zn\ Cl_2$ is split or dissociated into the cation Zn which becomes positively charged and moves towards the negative pole, and the anion Cl_2 which becomes negatively charged and moves towards the positive pole." (Prinz-Sturridge[1].)

"The Ion itself may be an invisible product of electrolysis." (Sturridge[2].)

"* * * * the passing of a galvanic current thru the body is regarded as productive of ions * * * *" (Ibid.)

"This is what is known now as ions of the metals which are dissolved by the action of the current." (Ibid.)

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[1]Herman Prinz, Dental Materia Medics and Therapeutics.—C. V. Mosby Co., St. Louis, Mo., 1916.

[2]Ernest Sturridge, Dental Electro-Therapeutics.—Les & Febiger, New York, 1914." * * * * *

"* * * * good results were invariably obtained with simple salts from which ions of an antiseptic nature were readily formed by a low current strength." (Ibid)

"All substances are not dissociated by the effect of the current." (Ibid.) * * * *

"Aside from the misconception of Ionization by the current, there is another misuse of the term "Ionization" (or to ionize) to express the action or effect of ions upon the various tissues which we wish to treat. This misuse is apparent from the following quotations:

"The therapeutic effect of the ions * * * * must be determined in the selection of the drug for ionization." Ionization with Anions". (Prinz-Sturridge.)

"Needles of zinc and copper are also used sometimes to pierce the part to be ionized." "Caré has described the following method for preparing sounds for the ionization of fistula, urethrites, etc., (L. Jones).

"Zinc Ionization for Epithelioma." "Salicylic Ionization in acute Rheumatism." "Lithium Ionization in Gout." (Tousey).

"Copper electrodes are often used by the author for the ionization of fistulous tracts* * * *" "The effect is, in case of ionization with an antiseptic ion * * * * * " (Sturridge).

Now, we all understand that neither the purpose nor the intention exists to ionize (or convert into ions) the tissues in question, since, all that concerns us, is simply the therapeutic effect of the ions of our drugs."

In Electrolytic Medication we often employ ions which come directly from the "soluble" anode. These ions according to Sturridge are an immediate production by the current and according to Lewis Jones they are the result of secondary reactions. In my original article I pointed out that neither view is correct. After describing the respective demonstrations of these two authorities I continue: "What, then, is the real cause of the appearance of these ions? We may now give as our positive answer, that the ions in question are due to the **electrolytic solution pressure** of the metals and, in the case of the experiments above, to that of the iron and copper. For this solution of the problem, we are indebted to Prof. Nernst (W. Nernst-Ztschr. Phys. Chem. 4, 129) (1889), who did not primarily introduce the electrolytic solution pressure to account for the presence of ions, but rather for the establishment of the source of electromotive force. With the ratio of the electrolytic solution pressure (P) to the osmotic pressure (p) of the solution (the moist medium of the above experiment), Nernst was enabled to develop his famous mathematical formula to express the value of electromotive force (E):

$$E = 0.029 \log \frac{P}{p} \text{ volts}$$

in the case of a bivalent metal or

$$E = \frac{0.058}{n} \log \frac{P}{p} \text{ volts,}$$

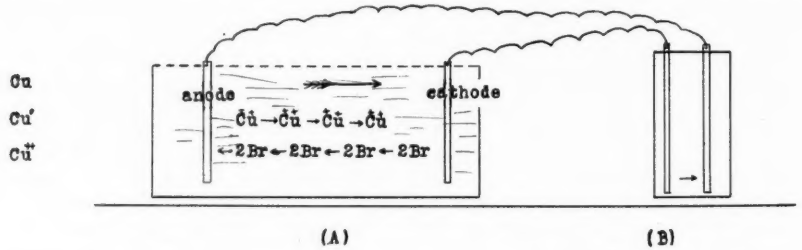
in which n stands for n valence of the metal."

Electrolysis.

With a clear understanding now of Ionization we are in a fair position to develop our conception of Electrolysis, [since Ionization is a condition without which no electrolysis can take place.] The solution in which Ionization is assumed to have taken place constitutes an Electrolyte. This Electrolyte possesses the property of conducting the electric current as we saw. Now, if any Electrolyte be placed in circuit with a source of an electromotive force a current will flow as can be attested by an ammeter. After a sufficient lapse of time the current will cease to flow and the Electrolyte upon examination will reveal the fact that the original dissolved substance has disappeared and that it was decomposed by the passage of the current. Hence, you observe that electric conduction is possible only at the sacrifice or loss of the ions in the

Electrolyte. This is precisely what is meant by Electrolysis, namely, **a chemical decomposition by the electric current.** Note particularly at this point where there is no conduction there is no Electrolysis, and conversely; these two facts go together. Let us examine into the mechanism of these two facts by means of the following illustration:

In our illustration we represent eight positive charges for four copper ions and eight negative charges for eight bromin ions. As the picture stands the phenomenon of ionization is done and completed, no current having been employed. Now, turn on the current. What happens? The anode becomes positively charged by the source



(A) represents the Electrolytic cell containing the Electrolyte copper bromide, such as we obtained in our experiment No. 2 which is ionized into its

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cuprion (Cu) and bromidion, (Br). We might state in passing, these ions are an allotropic modification of the atoms for which the symbols stand. Thus the symbol Cu stands for the atom, copper, in the compound; or for the elementary copper when we indicate this by placing the degree sign (°) to the right of the symbol (Cu°) or for the ions when we employ the plus or minus signs for such

$$++$$

designation as (Cu).

(B) of our illustration represents the source of electromotive force. In connection with the illustration we will place our copper bromide solution of Exp. 2 in circuit with four dry cells. The deposition of copper upon a nickel which I will employ as the cathode may be examined after our meeting. We might here remind ourselves once more that the ionogen $Cu\ Br_2$ produces equal numbers of positive and negative ionic charges in the Electrolyte.

of the current and meets with the ionic particles of the copper ions holding positive charges, and bromin ions holding negative charges. As we know from Physics, like signs repel and unlike signs attract each other. Consequently, the copper-ions will be repelled and the bromin-ions will be attracted. But opposite electricities neutralize one another so that the bromin-ions, losing their negative electricity are set free. Simultaneously the copper-ions being repelled from the anode travel towards the cathode; here they are attracted, but their positve charges are at once neutralized by the negative charges of the cathode, so that they are also set free and deposit themselves on the electrode. One copper-ion and two bromin-ions being set free means the decomposition of one molecule of copper bromide. This process continues with another set of ions and then with another until the whole Electrolyte is exhausted. As the decomposition takes place strictly at the electrode surfaces by neutralization of the charges of the ions with those of the electrodes, the ions must of necessity move towards them. We therefore ob-

tain another phenomenon which is known as **Ionic Migration** in which the positive ions move in opposite direction to those of the negative ones. But these opposite ions move with different velocities which seems to be somewhat in contradiction with the statement that equal numbers of ions are simultaneously liberated at the two electrodes. But we cannot discuss this question now. The ions carry a definite amount of electricity so that the quantity of the material liberated becomes a measure of the current passed, and visa versa. This is embodied in Faraday's law of "Electro-Chemical Change" which we must also pass by at this time.

Application of the Theory of Ionization and Electrolysis to Electrolytic Medication.

I have now expatiated somewhat on Ionization and Electrolysis, because with a clear conception of these two phenomena we will the better be able to develop our theory of Electrolytic Medication. Electrolytic Medication may be defined as the process of conveying medicinal ions by means of the galvanic current into the deeper structure of the tissues which we wish to treat or medicate. You observe that I here employ the term "Electrolytic Medication" where you would have expected the use of "Ionic Medication."

Allow me to read the following passage from my original article in which I suggest the term "Electrolyte" for "Ionic": "What can be said about the name of that branch of Medication which we effect by means of the galvanic current? At present, it is called "Ionic Medication." Is the name appropriate? By convention, perhaps, it has come to assume the meaning, but, in strictness, it does not express the essence of the process. The writer would suggest that the term "Electrolytic" be substituted for that of "Ionic", for reasons which are too apparent to be passed by. We have Ionic Medication in the absence of all electric current when, for instance, we seal zinc chlorid in the root of a tooth for antiseptic purpose. We know that the dissociated zinc (i. e., the zinc ion) of the compound possesses the antiseptic property primarily, and not the dissociated chlorin, for, otherwise, any indefinite chlorid could be employed. If, then, the zinc ion sterilizes the root canal specifically, in as far as it is in the ionic condition, we certainly have ionic medication, altho we never applied the current. Consequently, we include in the term "Ionic Medication" more than we really express. Dr. Tousey (Sinclair Tousey—Medical Electricity, W. B. Saunders Co., 1915,) avoids this difficulty by using the expression, "Ionic Medication by Electrolysis". In selecting the term, "Electrolytic", we introduce nothing new, but simply employ the nomenclature of Faraday (1835), the discoverer of the **laws of electrochemical change,** who called the process of conduction of electricity by an electrolyte by the name, **Electrolysis.** (LeBlanc—Text-book of Electro-Chemistry, The McMillan Co.) Now, since the Medication under discussion depends primarily on the movements of particles (the Ions) of ponderable matter, and this movement is essentially the conduction of electricity it is apparent that no better name could possibly be employed than the term "Electrolytic."

In order to picture to our minds how the ions are transported, let us compare the human body to the electrolytic cell which we showed in our illustration. As far as the conduction of the current is concerned, it is immaterial of what the electrolytic fluids of the body are composed, they may even be of an indeterminable mixture. The sponge-electrode—technically called the indifferent electrode—may be moistened with any electrolyte you choose. Remember well, Electrolysis takes place only at the electrode surfaces, and between the electrodes we have simply migration of ions. Now, let us assume we employ zinc-

chloride solution—which you recollect is already ionized; the current having had nothing to do with the Ionization—we wrap a platinum broach—or some other metal would do—saturate it with zinc chloride and insert it into the root of a tooth in such a manner that the solution on the cotton forms a continuity with the body fluid at the apex. The broach itself need not, necessarily, reach as far as this. We make the broach the anode, or the positive pole. The indifferent electrode which may be strapped say to the wrist, constitutes the cathode, or negative pole. Now if we turn on the current and remember that the zinc-ion migrates to the negative pole, we readily understand, the only passage of the zinc-ions in the effort to reach the negative pole is from the apex of the tooth into the structure immediately surrounding the tip of the tooth. The depth of migration or penetration into the tissues depends on the time during which the current is allowed to pass; in practice, we say, from ten to fifteen minutes is sufficient. The chlorin ions, on the other hand, travel in the opposite direction, namely, away from the apex, and is liberated as free chlorin on the surface of the broach; whence it may escape as a gas being thus removed from the site of medication. As the chlorin is liberated on the broach surface, zinc should also be simultaneously deposited on the negative electrode at the wrist. But the zinc ions cannot instantly reach that pole so that in its place the metal ion of the Electrolyte in the sponge is deposited and the zinc ions of the medicament continue to migrate deeper into the tissues. It is customary to employ salt water with the sponge. The metal of this solution is sodium, an extremely powerful caustic and would destroy the tissues at the indifferent electrode. But remember sodium is liberated on the electrode surface and not on the flesh; the sponge intervening, preventing actual contact. That the sodium enters into a secondary reaction does not concern us here. Secondary reactions of this kind are quite numerous and require special study. If we had a medicament in which the ion—say, iodin-ion—constituted the antiseptic agent, then we reverse the polarity of our electric source. We always select that polarity which will cause the ion desired to flow into the tissue.

The Therapeutic Effect of Electrolytic Medication.

I hope my exposition up to this point has been sufficiently clear to give you a fair understanding of Electrolytic Medication in its coarse outlines. As we have avoided a review of the numerous theories involved in the process so we will also omit the details of the technic therewith connected; as all these can be brought out in our discussions. What I wish to touch upon especially is the Therapeutic Effect of this mode of Medication. We are not amazed at present when the radiograph reveals to us that a root which we treated and filled many years ago shows a shadow at the apex of the tooth. How often have we modified and remodified our methods of antiseptic treatment to overcome this common occurrence? In order to cover over or explain all these infections which we thus find, a common theory is held that the condition was aseptic at one time; but has become septic subsequently by the carriage of infectious bacteria by the circulation or otherwise. It is not my purpose to dispute this latter theory but I would like to emphasize the following: What scientific proof have we that the condition about the apices of our devitalized teeth was **aseptic at one time?** No doubt, here lies the cause of our trouble: We have never been assured of absolute disinfection. With our usual treatments we simply place an Ionic Medicament in the root canal; seal up, and then depend upon the diffusion of our drug. We may reasonably assume that we medicate up to the very surface of the limiting walls; but we have no assurance that our antiseptics exercise

any potency **subcutaneously** or as suggested by Dr. H. T. Smith **periapically.** Many surfaces, as we know in general medicine, once infectious, may heal over with a formation of a new tissue, burying the infectious bacteria underneath. No antiseptic topically applied would reach those bacteria, which at any provocation may suddenly reappear at any time. If we consider the complexity of structure in the neighborhood of the apices of our teeth, a subcutaneous habitat by the bacteria may be readily assumed possible. Here antiseptic treatment would be of no more avail than has been possible with other parts of the body where the structural tissues are simpler and better adapted for absorbability; as in the mucous membrane. Personally, I have always held that the root canal with its almost innumerable dental tubuli presents a physical condition which directly counteracts the diffusion of the drugs. We know that the smaller the diameter of the tube is, the larger is its capillary attraction. The capillary attractions of all the tubuli are additive so that a considerable suction force would be necessary to overcome the total surface attraction of all the tubuli. It seems to me that this capillary attraction should greatly overbalance the diffusive power of our drugs. With regard to the disinfection of the entire length of the tubuli themselves, we may accept the condition that the bacteria at the entrance of the tubes are destroyed; but that further back they are never reached. Again we know that the diffusion itself is a phenomenon depending directly upon the osmotic pressure. It would be an intricate problem indeed to figure out how this osmotic pressure is modified within the encasement of a sealed root canal. The few circumstances thus mentioned are arguments against absolute disinfection (it being understood that temporary sterilization which is probably always accomplished, merits no consideration in this connection). If then, our modes of treatment are really so ineffectual, a positive method should be quite welcome. Personally, I am convinced that Electrolytic Medication supplies us with such a method; first, because its principles rest upon scientific facts and secondly, on account of the clinical evidences. The Therapy of Electrolytic Medication is a Pharmacological one; and hence, its reactions are those of Ionic Chemistry. If simple double decomposition with the formation of albuminates from the albuminous material of the germ-body does not satisfy, more energetic means, namely, oxydation or reduction processes, may be introduced, so that the therapeutic effect can be depended upon, providing the bacteria are reached wherever they are. But the antiseptic ions under the influence of the galvanic current will absolutely go where the electrolytic fluids of the body forms the electrical path; and this path is an extremely divergent one, so that every part to be disinfected can be reached.

Report Cases.

I. I desire to enumerate just a few cases from my own practice which gave highly satisfactory results:

A. C. Male, aged 50 variously treated at different health resorts for Sciatic Rheumatism. He was practically cured at the time of his first visit. I advised him to have radiographs made of his teeth. The pictures showed all the teeth normal, except for a slight pyorrhetic condition at the lower central incisors. After scaling these teeth, I gave the electrolytic treatment for 15 minutes with zinc-ions employing a current of 3 ma. Eight days later another treatment was given with zinc-ion for 15 minutes with a current of 3-4 ma. Still eight days later I treated the gums with iodin-ion for 10 minutes; employing a current of 4 ma. I show the case in illustrations completely cured in 14 days.

II. Dr. F. H. aged 45. Pyorrhea alveolaris, upper and lower arches involving 20 teeth with pus discharge and exces-

sive recession of the gums. A radiograph was made for future reference. After careful scaling, copper-ion was employed for 5 minutes per tooth with a current of 4 ma. After this I treated the mouth in sections, taking five teeth at a time, and treating the patient twice a week. At these sittings I employed zinc and iodin-ions giving 10 minutes to each tooth with a current from 4 to 6 ma. After three weeks I tried to grow a culture which failed after 48 hours of incubation. This patient now calls monthly.

III. November 17, 1916. B. J., male, aged 35, with a fistula from the apex of the upper right lateral. The nerve probably died from the irritation of a large gold filling inserted seven years ago. Treatment with zinc-ion was applied for 35 minutes with a current of .6 ma. The root was filled at the same sitting and a synthetic filling inserted. Saw the case a month later in excellent condition. In this case report you note I employed only .6 ma. Why such a small current? It was the largest amperage I could obtain in his patient. Ordinarily the question would be answered by stating: on account of the high resistance of the patient. But it would be more correct to say: on account of the low conductivity of the patient. Upon this point I said the following in my original article:

"While, upon the question of the resistance of the body, the writer would briefly criticize the manner in which this subject is treated in our usual textbooks. We should not speak of **resistance** at all. The proper designation is **conductance** (or conductivity), which is the reciprocal of the resistance. Resistance is used in speaking of conductors of the first class, such as the metals, while **conductance** is applied to conductors of the second class, namely, the electrolytes, of which the human body is a representative. The measurement of the **conductance,** in reciprocal ohms ($\frac{1}{\text{ohm}}$), of electrolytes is essentially different from that of the ohms in the conductors of the first class, for which discovery, as also for the method of measurement, we are greatly indebted to Kohlrausch. Kohlrausch (1880) introduced the alternating current in connection with the Whetstone Bridge, for measuring the conductance of electrolytes in order to avoid polarization, which is always produced with the direct current, and which gives inaccurate information. This being true, the information as given in our text-books on the resistance of the body and the calculations derived from it must necessarily be misleading."

IV. (November 17, 1916). Miss I. H., aged 30, revealed a joint rheumatism of the left arm which she could not move in any position without the aid of the other hand. Her history is this: Ten years ago she fractured a corner of the right upper central incisor, which was subsequently restored with a gold filling; no attention being given to the condition of the pulp. Recently a slight fistulous had developed over this tooth. At the recommendation of her sister, who was still under treatment, she came to me for consultation. I gave her the electrolytic treatment at her first visit with zinc-ion 15 minutes with a current of 3 ma. At her second visit, one week later, the abscess had completely healed. I treated the tooth once more with zinc-ions for 10 minutes and with iodin-ion, 5 minutes, and at once filled the root. Two weeks later she reported that her arm was rapidly improving. Believing that the electricity produced the desired results she intended to take further electrical treatment for her arm from some specialist. Knowing that the good effects were achieved from the cured condition of her tooth, I advised her to the contrary. Today she has almost the full use of her arm.

V. (December 2, 1916). Miss C. H., aged 25, displayed an acute pericementitis of the upper central incisor. I had to remove a Logan to get at the condition. A week or so later, I successively

tried the following treatments without the current: Formo-cresol, sodium dioxide, zinc chloride, phenol, Black's 1, 2 and 3, with powerful sprays of benzoic acid in between; but I could not stop the profuse flow of pus in spite of the fistulous opening. These treatments covered a period of six weeks. Finally, I gave her one electrolytic treatment for 10 minutes with a current of 3 ma., and requested if she has no pain to call a week later. No pus could be found at this sitting. I tried to grow a culture by infecting a culture medium with some extracts from the apex, but no growth took place after 36 hours of incubation. I had the patient call a week later. Then I applied the electrolytic treatment once more for 10 minutes with zinc-ion and replaced the Logan. The condition is excellent today.

VI. (December 7, 1916). Mr. Wm. R., with an acute abscess of the left upper cuspid in which the pulp had died. The cheek was largely swollen and the eye was closed. I applied a sponge electrode to the face saturated with magnesium sulphate (Dr. Martin Fischer's salt solution) with a current of 3 ma. Relief was felt, cheek softened, and swelling considerably reduced after fifteen minutes. The next morning the swelling had disappeared. This case gave me extreme satisfaction on account of the suggestion which I made in my original contribution and which I will read to you: "In conclusion, the writer would exhort those members of the profession now practicing electrolytic-medication to turn their attention to, or try out, the application by means of the galvanic current of Dr. Martin H. Fischer's (Martin H. Fischer—Oedema and Nephritis, John Wiley, Inc., 1915), salt solution in oedematous conditions about the mouth. It is not known to the writer whether or not Fischer's salt solutions have been introduced in this way. Certainly, these solutions, being specifically employed as electrolytes, could be easily introduced into the tissues by the current, especially, since neither cataphoretic, nor anaphoretic transport is intended, but, primarily, only that of either the positive or negative ions of the solution. The one successful and rapid means of relieving those troublesome swellings about the gums which are so vexing to the dentist, and so painful to the patient, would amply justify the practitioner in familiarizing himself with the principles and technic of electrolytic medication."

In citing the above cases I mentioned various currents ranging from .6 to 6 ma. What might be said on this point is well stated in my original article: "It being understood that electrolytic medication consists essentially in the application of drugs which in the ionic form are carried into the tissues by a continuous electric current, the question may now be asked, what particular phase of the physics of electricity should chiefly occupy the practitioner's attention. This particular phase is the exceedingly important question of **electrical energy**, without a real conception of which, electrolytic medication can never stand out as a true science. We must conceive electricity as an **energy**, like we do heat, light, work, etc., if we would understand the essence of electrical phenomena. The failure in our current literature to consider electricity as an energy, is probably the chief cause of the discrepancy among our authorities on the point of voltage or amperage to be employed. While each of the authorities recommend a certain suitable current, or amperage, they all seem to show some uncertainty as to the electromotive force to be employed, as tho this were a matter of choice, to be worked out by practice. Naturally, as we know, a certain current passed thru the body will, in a measure, determine the voltage, because the patient will just tolerate a certain dosage, or "pain limit," as it is called by some writers. Now, neither current, nor electromotive force, separately, constitutes electrical energy, but if we take the product of these two factors, current and electromotive force,

we arrive at the definition of electrical energy." * * * * *

"We know from Faraday's law that the greater the quantity of current (in coulonds) is, the greater will also be the quantity of ions which will migrate into the tissues. Consequently, by reducing the voltage, we can correspondingly increase the current with the resultant greater movement of ions, without altering the electrical energy numerically, i. e., without hurting the patient by overcharging. We may adopt the voltage as small as we choose, providing we observe the limits of the decomposition voltage of the substances around the electrodes." * * * * * * *

"In conformity with what has just been said, an "electrolytical posology"—if the writer may thus introduce the term—could be elaborated with a complete neglect of the resistance (?) of the various parts of the body. By employing a certain voltage—say of ten volts—and enclosing a standard milliampere meter in circuit with any part of the body, we could read off the current directly. We would thus have both the intensity factor (V) and the capacity factor $\left(\frac{C \text{ ma}}{1000}\right)$ of the electrical energy impressed upon the part of the body in question. The calculation would be simple, viz:

$$V \times \frac{C \text{ in milliamperes}}{1000} = E.$$"

BAD TEETH AND THEIR EFFECT ON THE LABORING MAN'S EFFICIENCY.*

By Carl E. Smith, D. D. S., Akron, Ohio.

(Read before the Section on Preventive Medicine and Public Health at the Sixty-Seventh Annual Session of the American Medical Association, Detroit, June, 1916.)

EFFICIENCY from a health standpoint is difficult to determine. We know, for instance, if the water supply of a community is pure, the community is saved economic loss from typhoid; the same can be said of the milk supply and of all the precautions necessary to keep a community in health.

This is true from a dental standpoint. If we teach a large body of people mouth hygiene we cannot say how much better their health will be, or how much we have saved them thru the prevention of mouth and systemic diseases.

In the past sixteen months I have made 30,000 mouth examinations, for 17,000 Americans and 13,000 foreigners. Of this number, 96 per cent. are in need of dental service; only 4 per cent. have clean, healthy mouths; 9 per cent. are without cavities and could be made healthy by a thoro cleaning; the balance have all the pathologic conditions known to dentistry, pyorrhea pockets, decayed and abscessed teeth, mucous plaques with all the virulent bacteria ready to cause disease the moment there is a lowering of the resistance. The danger from a dirty mouth is quite generally recognized, practically all contagious diseases being transmitted by the nose or mouth and the mouth is the more dangerous of the two. In a mouth free from caries, but with deposits of calculi and mucous plaques, gingivitis develops, and because the gums are painful and bleed the man gives up mastication, and food passes to the stomach carrying pathogenic organisms. The stomach cannot do double duty and in time disease results. And so by teaching oral hyigene to the laboring man and he in turn carrying the idea to his family, we are cutting down disease, not only in the factory, but in the community.

Suppose an epidemic of scarlet fever breaks out in a city. The health authorities find these cases along a certain milk route, and they look up the farms on which this milk is produced and find a case of scarlet fever. I have never heard a satisfactory explanation of now that first case started, apparently spontaneously. Could it not be a case of lowered vital resistance from some cause and a dirty mouth, in which the germs of scarlet fever predominate? Whether this be true or not, the teaching of oral hygiene to the laboring man is important if it does nothing more than prevent caries, pyorrhea, and other mouth diseases.

Now in 30,000 mouths we find about 60,000 cavities, and I intend to show what one cavity means to the average laboring man. First, there is the slight opening of the interdental space; food packs into the space, irritating the gum. Quite naturally he gives up mastication on the side of the mouth; caries progresses until the pulp is exposed, the tooth aches,

*Published in The Journal of the American Medical Association.

and he goes home from work, often purchasing a bottle of whisky on the way. I have had cases in which the patients have admitted spending their last cent for whisky and had to borrow money to go to the dentist.

The pulp in the tooth may die in twenty-four hours, or it may stop aching, only to start again in a few days. If the pulp dies, in a period of time we have the acute alveolar abscess and at last in desperation he goes to the dentist and has the tooth extracted. During this period of time, due to disuse, quantities of filth have collected over the other teeth on that side of the mouth, caries has started in the tooth next to the one extracted, and within a few months he again goes thru with the same experience. By this time the other teeth have become decalcified, and within a comparatively short time he loses every tooth on that side of the mouth, and it is easy to understand this man could not be marked 100 per cent. in efficiency during this period. If we admit the teeth to be necessary to mastication and digestion, we know that the employee cannot enjoy the good health he would have had, had we been able to prevent that first cavity, or at least to persuade him to have dental service before it was too late.

In 30,000 mouths we find about 18,000 extractions necessary, and experience shows these teeth to be practically all abscessed. This is a difficult problem in efficiency, especially so if the findings of the Research Commission of the National Dental Association in regard to the relation of infections of the mouth to general systemic disorders prove only part truth, but the indications are at the present time that these apparently unimportant foci of infection are the cause of many disorders.

The average dentist knows little at the present time regarding the effect of these foci of infection. If it is arthritis, stomach ulcer, heart lesions, pernicious anemia or any of the nervous diseases of the neuralgic type, the medical man is consulted. If it is true that these foci of infection are causing these obscure diseases, it is time for the dentist to learn more of medicine, so that he may hold intelligent consultation with the physician, and the physician should seek the consultation of intelligent dentists. One case along this line I wish to report. After working for the company for six years this man laid off in November, 1913, to have a mastoid operation. In July, 1915, he applied for reemployment. Physical examination showed ankylosis of the knee and poor physical condition. The mouth examination showed a very bad case of pyorrhea and several abscessed teeth. His mouth may not have been the cause of his trouble, but the surgeon overlooked the possible cause, and the patient should have been sent to a dentist. Had this been done, he might at this time be an efficient workman. On the other hand, there are no doubt a good many of your patients whom you are burying on account of poor dentistry.

I wish to report a case which to my mind shows how bacteria are carried by the blood stream. A man injures a tooth in such a way as to kill the pulp. After a period of time an alveolar abscess develops. I have seen a number of these cases without a cavity in the tooth, no pyorrhea, and gums in a healthy condition. There is only one way that infection could occur. The bacteria were carried there by the blood stream from some focus of infection. If they are carried to the teeth, it follows naturally that they are carried from these blind alveolar abscesses.

If a man presents himself to our physical examiners with a suppurating toenail or infected finger nail, he is promptly rejected as being unfit for employment, likewise if he has an acute alveolar abscess with a swollen jaw he is rejected until the cause has been removed and the swelling subsides, but we cannot reject these men with 18,000 necessary ex-

tractions, knowing, or at least suspecting, the effect on their efficiency; if we did, it would mean the rejection of 25 per cent, of all people applying for employment. The best we can do is to advise the removal of these teeth. In 30,000 mouths we find 40,000 teeth extracted, and that tells its own story the inability to properly masticate the food, and you medical men know better than I the result of improper digestion which are bound to follow.

One way we can estimate the loss of efficiency due directly to toothache is by watching the piece-worker. Very often a man engaged in piece-work will say: "Doctor, this tooth has ached for a week." The loss of money to these men runs from $3 to $7 for the week. Men suffering for a day report losses of from 35 cents to $1.50.

In 30,000 mouths we find 60,000 cavities and 18,000 extractions necessary, 78,000 in all. If each one causes an average loss, thru waste of time and cost of repair, of $2, it means a cost of $156,000. In New York City last year 67,000 children failed to be promoted to higher grades because of absence, 80 per cent. of which can be laid to defective teeth, and it costs New York $1,037,696 to duplicate a year's schooling to these absentees. These same children in a few years will be employed by our industrial concerns and a large percentage will fail of promotion on account of poor health due to bad mouth conditions.

What can be done by way of prevention? The first thing necessary is the co-operation of the medical man; he is the first to see the pregnant woman; he should instruct her regarding what to eat to supply the necessary mineral salts to build bone and teeth, and send her to the dentist for instruction regarding the care for her mouth. The dentist should instruct her regarding the mouth of her child when it arrives, also regarding the care of that mouth after the teeth begin to erupt. It is possible to take a child at this time and prevent the formation of cavities, and it is most important that this should be done.

We find at the present time a great many dental clinics in the public schools. This is a good work, but the child is 6 years of age when he starts school and a great deal of damage has already occurred, so the work of the clinics is largely reparative, but still it is not too late to teach the children oral hygiene. They should be taught how to live, which is vastly more important than certain subjects which have been a part of the school curriculum in past years. If this were done, they would leave school and enter our industrial institutions better equipped to earn a livelihood.

During the past two years dental clinics have been established in a number of large manufacturing concerns. These clinics are operated along different lines, but all with the same general idea in view, that of co-operating with the medical departments in bringing about more satisfactory health conditions.

THE TREATMENT OF INJURIES TO THE JAWS.

By Thew Wright, F. A. C. S., Buffalo, N. Y.

(Read before The Buffalo Unit of the Preparedness League of American Dentists.)

INJURIES to the face and jaws requires such rational treatment and so close a co-operation between the dental and the general surgeon that a brief discussion of the principals which should govern such treatment may well be profitable to us both. We will consider here, especially, injuries received in war and particularly those associated with fracture of the maxillae. The first and immediate care of such injuries should be directed to the prevention of infection and the stopping of serious hemorrhage but it must be borne in mind from the first that the most important question in face injuries is, that of the presence and extent of injury to the maxillae.

Fractures of the maxillae, especially the mandible, follow the same general lines and their treatment should be guided by the same general principals as fractures of other bones but there are certain local conditions which must be taken into account. First. The mandible is a very mobile bone, supported and controlled by powerful muscles, irregular in shape and quite superficial. Fractures of this bone are, therefore, usually associated with considerable displacement. Second. These fractures are nearly always compound and usually communicate with the mouth, which even under the best of conditions is never surgically clean and, therefore, infection often adds much to the difficulty of treatment. Third. Because of its mobility and of the strength of the muscles to which it gives attachment, the fragments of a broken mandible are with difficulty held in proper apposition.

Cases of fracture of the jaw in military practice differ widely from those met with in civil life. First. There is always an external wound of greater or less degree. Second. They are nearly always comminuted and often multiple, with involvement of both upper and lower jaw. Third. More frequently than not the injuries are not confined to the jaws, but involve the eyes, ears, nose or pharynx as well. These facts make our work much more complicated and difficult. Our first task is to determine the number of fragments, the direction of the lines of fracture and the amount of actual tissue loss also to look for foreign bodies as well as misplaced teeth or fragments of bone which may be imbedded in the soft parts. If available the use of the X-ray may assist us materially, but here a word of warning. We must not remove fragments of bone simply because they are loose, for bone has great viability in the absence of infection and in our re-constructive work the presence of even a few healthy bone-forming cells may be of vast importance. I will not discuss the treatment of the injuries to the soft parts, as it is not essentially different from such treatment elsewhere, and I wish to place especial emphasis upon the matter of adjustment and setting of the bony parts. Our aim must be to create a comparative immobility of the parts and to restore the functional activity of the jaws as nearly as possible. Here is

where the dentist and surgeon must work together and it is only by the closest co-operation between the dentist and surgeon that we will meet with success. Until recently, surgical practice countenanced the wiring of fractured jaws or their plating by means of plates held by screws driven into the bone. These methods should be considered obsolete for they are far more often productive of harm than good. They are sure to fail if infection is present and the wires or screws often produce necrosis of the bone in their neighborhood. Such methods have been supplanted by either wiring the teeth or by the use of inter-dental splints plus some form of bandage to hold the mandible firmly against the upper jaw. This is quite satisfactory in civil practice but in war injuries we will find that the accompanying damage to the soft parts make such procedures rarely applicable. Some method of combining wiring and inter-dental splinting or the use of bands and wires must be used and the ingenuity of the dental surgeon will often be taxed to its utmost. The one thing of prime importance and the thing we must bear in mind, is the question of occlusion. All our efforts must be directed towards so immobilizing the parts as to have the proper relationship between the upper and lower teeth; no amount of gapping of tissues, hard or soft, should deter us from this. Cases with extensive loss of soft and bony tissues are hard to treat and no definite class of appliances can be described as suitable for all but we can formulate certain rules to guide us. First. We must try to prevent infection if possible, and if not, to control it by free drainage, frequent irrigation and antiseptics. Second. We must make no attempt to repair the injuries in the soft parts before a splint has been applied and the union of bony fragments is well under way. This may be a hard rule to carry out, for the ghastly appearance of some of the face wounds will make it hard to resist the temptation to treat the wound to the neglect of the fracture. It is the greatest importance, however, for us to remember that the main lesion is that of the bone and to lose no time in treating that. Fragments which should be in apposition must be so placed, as promptly as possible and then, Third. Some appliance should be devised to hold these parts in their normal relationship, using the normal occlusion of the teeth as our guide. This adjustment should be made as promptly as possible. The more promptly it is made the more prompt and certain will be the union. After bony union is well established we can easily take care of the wounds of the soft parts for the results of plastic work about the face are most gratifying.

These rules should guide us whether we have to deal with fractures without loss of bony substance or with those in which more or less bone is lost. Every fracture of the mandible should be treated in terms of the upper jaw and, as I have said, proper occlusion must be our guide. In cases where there is a loss of a portion of the entire thickness of the jaw, it is evident that direct union of the remaining fragments and normal occlusion are incompatible. In all such cases, the idea of union must be temporarily abandoned in favor of the preservation of the normal bite. Subsequently, efforts must be made to bridge the gap in the bone by some method which will give us a firm mandible, and at the same time, allow of proper occlusion. Fortunately, we have a means of attaining union in this class of cases by use of the bone-graft. Of all the additions to our surgical procedures made in recent years, there is none more gratifying in its results than bone-grafting, and under suitable conditions there is no procedure that is more certain of success. Long distances may be bridged by a bone graft taken from the tibial crest in various parts of the skeleton and this method is applicable in dealing with the mandible. It is considerably more dif-

ficult to obtain a successful graft here, because of the same conditions which make primary union of a fracture without bony loss, more difficult to obtain. However, by means of inlay or end to end bone splints, some very satisfactory results have been accomplished where only a portion of the mandible has been lost. I have spoken of the loss of substance in relation to fractures, for we are gathered here for the purpose of studying to fit ourselves to care for the injuries of war. In civil practice, when the loss of substance may be due to deliberate resection, the application of the graft should be immediate. When we have to deal with the loss of an entire half of the mandible, including the articular surface, we have a condition exceedingly hard to treat and one for which as yet I have failed to find a satisfactory method. I recently endeavored to substitute a portion of rib of the required length for such a bony loss but without success. In such a situation we have only one end of our transplant in bony apposition. In the case to which I referred, the loss of the jaw was due to osteomelitis and the severe and prolonged infection which preceded the ultimate loss of the bone, had left such an unfavorable bed of scar tissue in which to place the transplant, that its nourishment was too meagre, and its subsequent removal became necessary. Injuries to the jaws and face, whether in war or peace, can, in my opinion, be properly handled only by the most sincere and hearty co-operation of the general surgeon and the oral specialist, working together for the welfare of the patient, in their effort to restore to him, as far as possible, his normal appearance and the proper use of his jaws and teeth. No surgeon unless he has had especial training in oral surgery and prosthetic dentistry is qualified to handle these cases alone and unless the general surgeon realizes the fact, he cannot do justice to his patient in civil life. This fact is thoroly realized in the war zone and should be here. It has therefore been a great pleasure to have met with you to-night and discuss these questions of vital importance to us both.

The Research Department
CONDUCTED BY
THE RESEARCH INSTITUTE OF
THE NATIONAL DENTAL ASSOCIATION
WESTON A. PRICE, M.S., D.D.S.
President and Managing Director
CLEVELAND, OHIO

INVESTIGATION OF MOTTLED ENAMEL AND BROWN STAIN.

By Frederick S. McKay, D. D. S., Colorado Springs, Colorado.

(Researches Conducted Under the Auspices of the Research Institute of the National Dental Association.)

THE results accomplished to date in the investigation of the condition known as Mottled Enamel and Brown Stain are set forth in detail in an article by the late G. V. Black published in the Dental Cosmos for February, 1916, and in an article published serially by myself in the same Journal commencing in May and ending in August of the same year.

Black's work was principally in determining the histological characteristics of the lesion, which he declares is due to the absence, or failure of development of the cementing substance between the enamel rods.

The work of the writer has been chiefly in examining the native children of the afflicted districts for the purpose of determining the percentage of affliction, and in outlining the geographical boundaries of the endemic areas.

In addition to this an attempt has been made to establish some relation between the character of the domestic water supplies of the various districts and the occurrence of the lesion in those districts, but so far the evidence collected along this line has been contradictory, or to say the least inconclusive.

With the completion of this published paper just referred to, however, your grantee feels that in further prosecution of this research, we have at least established a more or less stable foundation, upon which to stand, and that from this vantage ground, a more comprehensive view of the whole situation can be gained.

The important thing for present consideration is the method of future study and in this the helpful suggestions of the members of the Commission will be most valuable.

If I were to outline my own suggestions, they would be along the following lines.

First, a most searching chemical ex-

amination, or analysis of this defective enamel, in contrast with a similar examination of normal enamel.

As pointed out in the published article it has been a matter of the greatest difficulty to obtain specimens of this lesion, and it is only very recently, in fact since the publication was commenced, that I have succeeded in obtaining any of these teeth, but at present I have a number on hand, which would serve admirably for this purpose.

I feel that along this line I particularly desire the co-operation and assistance of Prof. Gies and Prof. Bunting, who have adequate laboratory facilities for pursuing chemical, physical, and histological studies.

In what has been written to date it has been clearly pointed out that the problem has two distinct aspects, the one having to do with the failure of the cementing substance to be deposited between the enamel rods, the other, concerned with the deposition of some pigmented substance in these otherwise empty spaces, and it has been a troublesome question, as to how and when this infiltration has occurred.

Was this pigment laid in during development, or at least prior to eruption, or is it because of the permeation into the defective enamel, of some substance from the exterior?

Black seems to believe that the former is the true explanation, and that has also been the belief of your investigator.

Any consideration of this matter at once raises the old controversy of the penetrability of enamel, and it is not my wish to revive that at this time, but the question might properly be asked why it is that, if the pigment is deposited from the exterior after eruption, all mottled enamel, at least in the same individual is not stained?

It is a fact that certain teeth only, and usually only certain surfaces of such teeth are stained.

The study would not be complete, however, without careful experiments to determine the possibility of permeation of this enamel. In other words an attempt should be made to artificially produce the brown stain in mottled enamel out of the mouth.

No effort has yet been made to determine the chemical character of this brown pigment, which Black has termed "brownin," because of the lack of material.

Specimens are now on hand which can be used for this purpose, and it seems reasonable to believe that were these chemical constituents determined, a clue at last would be found that might point the way to their origin, and that determination might carry with it the mooted question of the penetrability of the enamel.

Altho the water findings have as yet been inconclusive, it must be acknowledged that certain associations and circumstances are so suspiciously intimate with the problem that further studies of these waters seem imperative, but these further studies must be of a character and thoroness totally different from those pursued thus far.

The waters from these endemic regions should be subjected to the most critical, compartive chemical analysis, but in attempting this we are met with the difficulty of access to chemical laboratories and analysis adequate for such work, but it would not be impossible, if the proper facilities could be located, to collect and ship a sufficient supply of the suspected waters.

Here again is the difficulty of knowing, that if such a method were undertaken, this work would be done sympathetically, that is by those who had a real and vital interest in the problem.

It would seem to me that such work should be done if possible within our Commission, in order to preserve the dental relationship.

As shown in the published article the various endemic areas are scattered over various States in this country and so far one such area is known to exist

in Europe, and already as a result of the publication of the article on Mottled Enamel a communication has been received that brings to light another afflicted district in South Dakota which will be made the subject of study during the year.

In many instances these areas comprise whole communities, and counties, and the largest one thus far located embraces hundreds and thousands of square miles, with scant centers of population, however.

The extent of area, and diversity of environment and habits of the population of these endemic communities when searching for the cause of the lesion, makes hunting for the proverbial needle in the hay stack seem like a simple procedure.

From this standpoint then, your examiner confesses to a considerable degree of satisfaction in being able to locate, after searching thru the nooks and crannies of a rugged mountainous region, such isolated and circumscribed areas as the Single Ranch and the Keeton Ranch, which are totally out of relation with any other afflicted territory, but which have produced families of children, who had been born and reared in that one environment, and who presented typical and pronounced cases of the lesion in its dual aspect.

Two additional similar areas have been located recently (the Wells Ranch and the Flannigan homestead) and it certainly seems as tho such small isolated areas should be given additional detailed study, just as soon as it can be determined what sort of study they need. These localities are not inaccessible and could be studied without any great difficulty.

For reasons pointed out in the published article, the Pima Reservation in Arizona offers another exceptional field for additional investigation, the great difficulty being its inaccessibility, unless the United States Government could be induced to undertake it, which is not without the pale of possibility.

In fact some attempt toward this end has already been started, and I am expecting to receive reports of additional investigations among other Indian communities in Northern Arizona thru Government Agencies.

Referring again to the question of water, it is hard to disassociate it from the occurrence of the lesion in the mind of the general public in afflicted districts, and I know of two physicians who are importing all water used by their children from near-by immune districts, as a possible way of preventing the mottling of the permanent teeth now forming, but such an experiment is difficult to carry out, and logically should include all water in which food for these is cooked as well as drinking water.

The results necessarily will not be apparent for some time, but the experiments will be watched with interest.

The selection of a coadjutor who shall assist in carrying on this work has not as yet been settled but the matter has been discussed with Edward C. Schneider, Ph. D., Professor of Biology at Colorado College, a physiological chemist of national reputation who has been intensely interested in this problem for some time, and while the pressure of his work has prevented him from undertaking any active studies thus far, there may be an opportunity later for him to do so.

So far as assistance on the field is concerned, I feel that even if Prof. Schneider cannot devote himself actively to the work as he would like to the investigation can receive aid in an advisory way.

In summing up, your investigator finds himself in much the same frame of mind as did Prof. Miller of the University of Virginia, who attempted a brief study of this lesion in his locality, reporting in the July Cosmos, says: "We have found great difficulty in finding any definite, tangible thing to study," and indi-

cates that if the lesion could be produced experimentally in animals, the mystery might perhaps be solved.

Regarding the latter possibility the writer feels that if we could once de-

Figure 1.

velop a single, definite, tangible fact, either regarding some chemical peculiarity of mottled enamel or the chemical composition of the pigment, or some

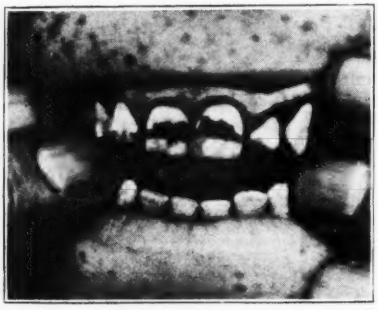

Figure 2.

such fact regarding the suspected water, it might then be possible to attempt the experimental production of the lesion in animals.

In conclusion, I regret that nothing more definite in the way of progress can be reported at this time, and will state that the work of the next year will be carried on in line with the suggestions herein outlined, and my hope will be that something more substantial can be presented at the next report.

Figures 1, 2, and 3 represent typical cases of both mottling and brown stain in which the latter is quite symmetrically located on corresponding teeth. The subjects are children of an average age of fourteen, all born and reared in a well known afflicted district.

It might be noted in view of the possible association of this lesion with freckled skin, both enamel and epithelium being derived from the same embryonic layer, that only one of these three has a freckled skin, the enamel lesion in the

Figure 3.

other two being of at least the same intensity.

Attention should be drawn in these illustrations to the thickened appearance of the gingival margin, which is so characteristic of sub-gingival irritation. In explanation of this condition it is constantly noted by close observers that the enamel surface of mottled teeth is usually rough and often extremely so, particularly under the gingival margin, which readily accounts for the condition of the gums. Much more might be said along this line.

The fingers shown in these three illustrations are those of G. V. Black. Think what they have done for dentistry!

Figure 4 is a very typical case, reared in the same locality, in which the en-

amel has been badly damaged, particularly by the pronounced pitting as noted on the cuspid and central incisor, upon which latter tooth the pits came perilously near to merging into decay. An

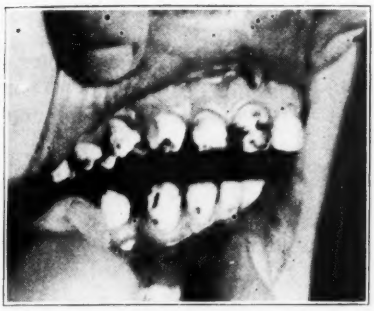

Figure 4.

idea of the roughened enamel can be observed upon the upper bicuspids.

Figure 5.—The enamel upon these teeth is comparatively smooth but the

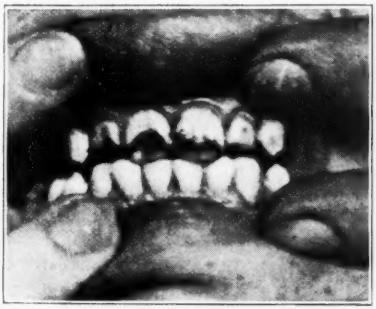

Figure 5.

gums show a less marked degree of irritation than in the first three figures. The stain upon the central incisors is very dark, almost black, involving the lateral incisors to a lesser degree, while the lower have entirely escaped the stain, as is usual. The child is a native of the same locality.

Figure 6.—This case exhibits a peculiar pitting of the enamel surfaces both upper and lower, a series of small shallow points upon the incisors but extended into broader, shallow roughened areas from the cuspid back. It seems most peculiar that upon the cusped teeth, these areas are usually located upon the points of the cusps, and upon the buccal surfaces, and the teeth erupt in this condition. The brown discoloration in this case, is practically absent. The child is a native of the same locality.

Figure 7.—Here is a young woman of about seventeen years who is most distressingly disfigured by this incorporated stain laid into the defective enamel

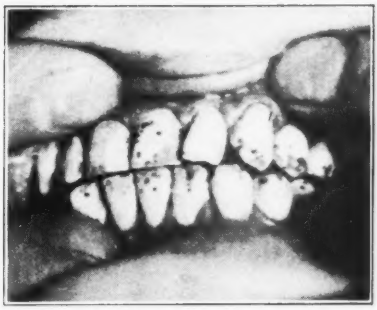

Figure 6.

from what source and by what means we are still ignorant. The enamel surface of the front group of teeth is not particularly rough nor pitted; in fact it bears apparently as perfect a glazed surface as does normal enamel, and yet under this glazed surface in the substance of the enamel is some substance which is almost black.

How shall we account for the lowers escaping when both groups of teeth are formed at practically the same age and we may assume under the same conditions, and yet this apparent discrimination in the location of the stain is not only common but the rule. There are but few exceptions. The posterior teeth show the pits upon the usual locations.

Figure 8 is a product of a different locality, far distant from the one pre-

viously considered, and shows a peculiar unsymmetrical distribution of the stain. In other respects the case is very typical. The gingival irritation is not pronounced.

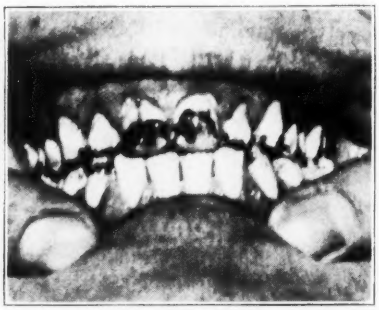

Figure 7.

Figure 9.—This case is of more than passing interest on account of the accuracy with which the markings upon the teeth record the age, meaning the amount of enamel development, at which he came into the afflicted territory. Practically the incisal half of the incisor crowns, upper and lower, had developed their enamel about normally before the individual came into one of the well known districts, and this change is at once recorded in the character of the enamel growth thereafter, or let us say under the new conditions, or changed environment. Almost numberless cases have been observed in which the marking of the teeth just as accurately records the age of beginning residence in afflicted territory as does this one.

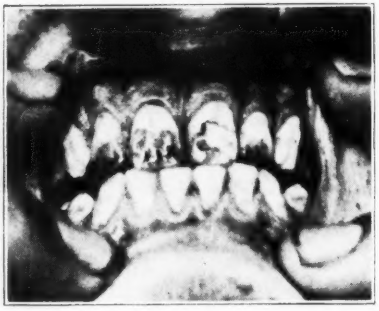

Figure 8.

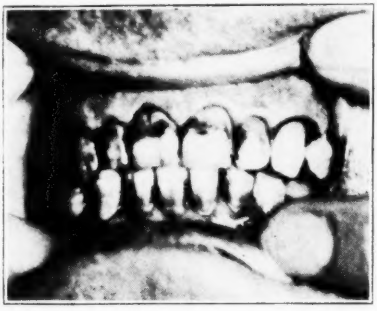

Figure 9.

The enamel in this case was not particularly rough on the exposed surfaces, probably because the individual had at the time of the photograph, reached well into adult life, hence the enamel had undergone frictional changes, but the appearance of the gums clearly shows the influence of the underlying irritation.

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EDITORIAL DEPARTMENT.

WHAT WILL YOU DO IN CASE OF WAR?

The time has come! Our Nation is facing one of the gravest crises in its history! As a profession we are in position to render to our government and to our fellowmen a service not to be equaled by any other organization of specialists. Will we accept the challenge? Positively and unflinchingly, yes! We will rise to the fullest needs of the emergency and prove our value and sincerity as a public service agency in our important field.

It is truly said that an army fights on its stomach and teeth. This statement covers the whole situation. As monitors of the teeth we are

supervisors of the stomach, hence, an army is helpless without our professional offices. We must, therefore, become a united army within our selves and throw our whole energy into the work that is before us.

First of all we must have organization. Next must be formulated sane and sound plans for action. These must be carried forward by men of capacity, influence and experience. The Preparedness League of American Dentists supplies the necessary organization and the following names represent the directors and dictators of the League; Board of Trustees, Thomas F. Hinman; Harvey J. Burkhart, Otto U. King, and Frank W. Low. Advisory Board, representing the National Dental Association; Edward C. Kirk, Lafayette L. Barber, Herbert L. Wheeler, H. E. Friesell, and S. D. Boak, Dental Corps, United States Army.

It is needless to comment on the peculiar fitness of these men nor to refer to the value of their united efforts in forwarding any movement for the welfare of humanity or our great profession. These men love their chosen calling, live for it each day and no effort or sacrifice within their power is too great to make its usefulness more potent. We urge **you** and every member of the National Dental Association to join the League and agree to, if possible, prepare the mouth of at least one applicant for enlistment to the National Guard, Army or Navy, who has been rejected because of defective oral conditions and is unable to pay for the necessary dental service, so that he may meet the requirements of the examining officers. We request that all such work be reported to the League headquarters.

Next we want you, if possible, to join the Officers' Reserve Corps, Dental Section, of the Army and equip yourself by joining a Sectional Unit of the League in your city or neighborhood and study the prescribed course in oral and dental surgery which will prepare you to pass the examination for entrance to this corps. Successful applicants are commissioned as First Lieutenant with salary of $2000.00 a year when in actual service. There is neither number nor age limit and none will be called to service except in event of actual war. The League will supply application blanks and has the assurance of the Surgeon General's department that less formality will be required of applicants vouched by this organization.

The ambition of the Preparedness League of America is to give our government the largest, most efficient and most representative Officers' Reserve Corps, Dental Section, of any nation in the world. This we owe to our country and to our profession alike. Do **your** part today and thus assure its accomplishment.

All further information regarding Reserve Corps, Sectional Units,

etc., may be obtained at League headquarters. Those wishing to join the Corps, should send full name, whether or not a member of the National Dental Association, College and date of graduation? If not already a member of the League, the editor of The Journal earnestly urges you to become so by sending one dollar, ($1.00) for active membership. The League needs funds to cover postage, printing and other necessary expenses, the clerical work being done gratis by the secretaries of the officers of the League. The officers of the Preparedness League of American Dentists are rendering a noble service to our country and our profession. They should have the hearty and enthusiastic support and co-operation of the entire dental profession. Address, Preparedness League of American Dentists, 3 Professional Building, 131 Allen St., Buffalo, N. Y.

Legislative Department

OFFICERS RESERVE CORPS.

By John D. Millikin, D. D. S., San Francisco, Cal., President of Association of Military Dental Surgeons, U. S. A.

Social and official standing and consideration in the Army, as well as salary, allowances, and privileges are based upon rank. The different grades of rank are as follows: Lieutenant, captain, major, lieutenant colonel, colonel and general.

Under the provision of the act of Congress approved June 3, 1916, citizens of the United States may be commissioned in the Officers' Reserve Corps, and are thus available for active duty in the event of war. They may be commissioned in said Reserve Corps, in the different branches of the service, up to and including the grade of major at once with the exception of the chaplains, dental and veterinary sections. In the dental section they can be commissioned in the grade of first lieutenant only, and will be required to serve on active duty eight years before they can be promoted to captain and twenty-four years before they can reach the grade of major. Physicians, railroad and steamship men, grocery and provision salesmen, hay and grain buyers, mechanics and such specially equipped men may be commissioned to the grade of major and at the outbreak of war, go to active service in that grade. It would take a war of eight years' duration before such men as Brophy, G. V. I. Brown, Hartzell, or Black could be promoted to the grade of captain in the Dental Section of the Officers' Reserve Corps, and an additional sixteen years before they could attain the grade of major. If they were commissioned in the Medical Section they could enter that Section as majors.

MILITIA.

The same is true in regard to the Militia so far as the dental surgeons, chaplains and veterinary surgeons are concerned, but the other officers of that force have the rank up to and including general officers. A dentist may be a captain of the line in one of the Militia companies, or one of the regimental majors in command of a battalion, but if he enters the Militia as a specialist (a dental surgeon), he must be a lieutenant, and eight years of service are required before he can be a captain. The physician, however, can join the Militia as a regimental surgeon and be commissioned a major at once. Or he may be commissioned a lieutenant colonel, or colonel with the duties of Chief Surgeon.

VETERINARIANS.

Now, there are two verterinarians to a regiment to care for about one thousand animals, and the same proportion of veterinarians for the other Army animals and a certain number for detail as meat inspectors. Upon the completion of twenty years' service these officers are promoted to the rank of major. There is no fixed number or proportion of majors in the veterinary corps. They can all be majors at one time. The only requirement is the necessary service, and of course the usual examination.

In the law regarding the Dental Corps there is a provision for one dental surgeon for each one thousand enlisted men of the line of the Army. Upon the completion of twenty-four years' service, fifteen of these dental surgeons only may be promoted to the grade of major. The sixteenth man must then wait till one of the fifteen vacates (by death, resignation or retirement) his commission as major before he can attain that rank, and so on down the list. As the law stands some of the present dental surgeons will be required to serve over thirty years in the lower grades. Several will, by operation of a general law applicable to all Army officers, retire for age (64) before they can reach the rank of major.

While two veterinarians are provided for a thousand horses, only one dental surgeon is allowed for a thousand enlisted men. And no account is taken of the seven thousand officers and thirty thousand enlisted men of the Quartermaster Corps, Hospital Corps, and other Staff Departments. Of course, they are entitled to the service of the dental surgeon just as much as the line men are but they are not counted in fixing the number of dental surgeons authorized.

MEDICAL CORPS.

Physicians enter the Medical Corps as lieutenants and in five years are promoted to the grade of captain. They are then promoted to the rank of major whenever a vacancy occurs. The average total length of service of the majors of the Medical Corps (compiled May, 1916,) at the time of reaching that rank is nine and four-fifths years. The law of June 3, 1916, created a sufficient number of vacancies so that every officer of the Medical Corps, and about thirty that are not yet in the service will have the rank of major by 1920. In the Medical Corps there are thirty-two per cent of the officers above the rank of captain; in the Dental Corps about eight per cent. In the Medical Corps they can fill a vacancy as soon as it occurs. The dental surgeons now have fifteen vacancies in the grade of major but none of them can be filled for nine years. The dental surgeon is not eligible to be a major till he has served twenty-four years. The medical officer is eligible to be a major the day he enters the service, if his vacancy exists. At least fifteen dental surgeons have more service than five-sixths of the present majors of the Medical Corps had at the time of promotion to that grade.

This unequal recognition is a reflection on the dental profession. There are in each Congressional District in the country a number of men who consider their profession the equal of any. It is with the aid of these men that it is hoped to correct the present defective law. The great majority of Congressmen and Senators will favor the proposed change if it is properly brought to their attention. If the better dentists thruout the District requests their Representative to favor a reasonable measure, he is quite certain to aid in its passage. The most difficult part of the work is getting the matter before the dentists thruout the country and making clear to them what is required.

The National Dental Association has adopted the following brief draft as a corrective measure and this has already been endorsed by many of the State Associations:

"Hereafter the Dental Corps of the

Army shall consist of commissioned officers in the several grades as authorized for the Medical Corps who shall have the same rank, pay and allowances as officers of corresponding grades of the Medical Corps, including the right to retirement as in the case of other officers, and there shall be for every seven officers of the Medical Corps authorized by law one officer of the Dental Corps. Dental officers shall be proportionally distributed among the several grades as in the Medical Corps, and their promotion shall be governed by the laws governing promotion in the Medical Corps: PROVIDED, That examining and review boards shall consist of one medical and two dental officers. Immediately following the approval of this Act all dental surgeons then in active service shall be re-commissioned in the Dental Corps, in the grades herein authorized, in the order of their seniority, and without loss of relative rank in the Army."

The Congressmen of each District in the United States should be asked by every dentist in the District, and the two Senators by every dentist in he State to support this Bill **when presented by the Legislative Committee of the National Dental Association for passage.** If these Legislators can be seen personally, so much the better; if they cannot, then three letters, one to the Congressman, and one to each Senator, will certainly bring good results.

Every dentist should let his representative know that the State Dental Association is back of the proposition, and that he himself is personally interested in securing a status for the profession of dentistry equal to that now enjoyed by the medical profession.

STATUS OF THE NURSE ANESTHETISTS—NOT AT PRESENT A PROBLEM FOR THE LEGISLATURE.*

Considerable confusion has been caused by a lack of clarity regarding the present status of the nurse anesthetist. The Interstate Association of Anesthetists, thru its secretary, has been appealing to various county medical societies to pass resolutions urging the legislature to reject proposals modifying the Medical Practice Act to permit nurses to administer anesthetics.

At the present time this matter is not before the legislature and is probable that it will not come before the legislature. Therefore, legislators should not be confused by petitions asking them to vote against a measure relative to which they are incomplete ignorance.

Briefly, the status of the situation is as follows: Several years ago the attorney general of Ohio rendered an official opinion, declaring that the administration of an anesthetic is the practice of medicine as the same is defined by our Medical Practice Act, and that anesthetics could be administered only by registered physicians. Immediately thereafter the dentists of the state secured an amendment to the Medical Practice Act extending to dentists the right to administer anesthetics.

In recent years several of the large hospitals of Ohio (notably Lakeside Hospital, Cleveland), have found that nurses after special training, and under careful supervision, could be used advantageously as anesthetists. Altho this constituted a technical violation of the law the State Medical Board was reasonably certain that it could not successfully prosecute these cases in the courts—as

*The Ohio State Medical Journal.

local sentiment expressed by juries would probably sweep aside such technicalities.

However, after the nurse registration law was passed, power was lodged with the State Medical Board to extend recognition to and approve hospitals. This formal recognition was necessary to the maintenance of nurse training schools in these hospitals.

At the time the question of recognition was under consideration, the Interstate Association of Anesthetists filed formal complaint with the State Medical Board against Lakeside Hospital, claiming that Lakeside was conducting a special school for the training of nurses as anesthetists. The board, after consideration of the matter served notice on the trustees of Lakeside Hospital that until this special school was discontinued it would withhold recognition of its training school for nurses.

After conferences, Lakeside Hospital agreed to abandon its special school for the training of nurses as anesthetists as soon as the present students are graduated. In return for this promise the board extended recognition to Lakeside Hospital's training school for nurses.

In the meantime, however, the Interstate Association of Anesthetists carried on a campaign to force the discontinuance of nurse anesthetists in all hospitals. This proposal has met with very general approval by county medical societies thruout the state. At its last meeting Council of the State Association went on record unanimously against any legislative action that would in any way lower the standards of medical practice and permit nurses to encroach upon this branch of the same.

However, the impression has prevailed that a bill modifying the Medical Practice Act had been introduced by Senator Howell Wright of Cleveland. This impression is entirely unwarranted. At the time this was written (January 24,) no such bill had been prepared or introduced.

Cleveland Hospital Council, of which Senator Wright is secretary, is on record in favor of a plan that will permit the continued use of nurses who have been specially trained in the administration of anesthetics. They think that economic conditions in large charity hospitals make necessary their continued use. Thru delegated representatives, the Cleveland group has discussed the matter with the legislative committee of the State Association and the State Medical Board. At this date no definite settlement had been reached.

The point is: Please don't "muddy the water," legislatively, by petitioning your legislators on this point, until the matter is definitely before the legislature. We and they have enough trouble, now.

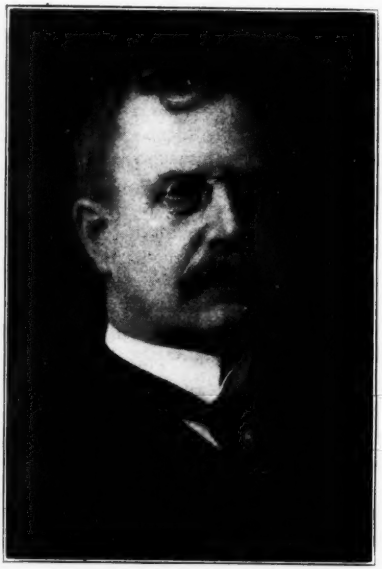
Items of Interest

TESTIMONIAL BANQUET IN HONOR OF A. F. EMMINGER, D. D. S., COLUMBUS, OHIO.

A TESTIMONAL banquet was given in honor of Dr. Allen F. Emminger, at the Columbus Athletic Club, Columbus, Ohio, Friday evening, February second, under the auspices of the Columbus Dental Society. Dr. Emminger has been a prominent figure in the dental profession of Ohio, during the past half century, and is now retiring after fifty years of continuous practice.

He was born at Mansfield, Ohio, studied under the late Dr. M. DeCamp of that city, and later attended the New York Dental College. He was a classmate of Drs. Wm. Carr of New York City and the late Sanford C. Barnum, who gave the profession the rubber dam. He located in Columbus in 1868, and it was due principally to his efforts, that the first dental bill regulating the practice of dentistry in Ohio, was passed the same year. He founded the Dental Department of the old Ohio Medical University in 1892, which is now a department of the Ohio State University; he was the first Dean and a Professor of Operative Dentistry for two years, resigned, and served four years on the Board of Trustees. He became a member of the State Dental Society in 1868; was elected president in 1881, and has filled every office. He has never missed a meeting of the Ohio State Society during his term of membership.

Dr. Emminger was elected President of the Mississippi Valley Dental Association in 1885, and served as President of the State Board of Dental Examiners from May, 1898, to April, 1902. He received an honorary D. D. S. from the Ohio College of Dental Surgery in 1876.



A. F. EMMINGER, D. D. S.

He also is a thirty-second degree Mason, a Knight Templar and Odd Fellow.

Dr. Emminger says, "I have promised myself an extended holiday fishing and hunting in West. Quite recently it dawned upon me that if I was going to have any fun, I had better not wait any longer. So I determined to start as quickly as I could."

In his pilgrimage to the West, he expects to make his base at Los Angeles. After several months of hunting and fishing in the territory adjacent via. automobile and railways, in company with Mrs. Emminger, he will pay a visit to the Hawaiian Island and from there go to Australia. On his return to the United States he may make his home in Los Angeles.

"Much of the fun Dr. Emminger anticipates will be made possible by the use of his automobile. Formerly he had several horses at his home at Seventeenth and Broad streets, but he is given to the use of his auto now and when he goes West he will express his car in care of his chauffeur."

"Despite the ownership of horses and an auto, year in and year out, rain or snow, Dr. Emminger has walked daily from his home to his office and return. He says he is certain that he has not paid more than $5 in street car fares."

His 70 years rest lightly upon his shoulders. His eyes are bright and his health is good and he says it is due to his outdoor life.

There were about sixty covers at the Banquet, which was presided over by Edward C. Mills as Toastmaster. Among the speakers were Drs. W. L. Gares, L. P. Bethel, H. Bartilson, Oscar Miesse, W. I. Jones, L. E. Custer, Dayton; H. R. Clark, Circleville, Chas. W. Mills, Chillicothe, John H. Bristor, Mansfield. At the conclusion, Dr. F. R. Chapman, Secretary State Dental Society, presented the doctor with a gold headed cane as a "token of the esteem of his professional friends."

DENTAL INTERESTS AND THE ATTEMPT TO LEGALIZE UNLICENSED ANESTHETISTS.

By F. H. McMechan, M. D., Avon Lake, Ohio, Secretary Ohio and Interstate Anesthetists.

During the Executive Session of the Interstate Association of Anesthetists, held in Lousiville, Ky., July 26, 1916, in conjunction with the National Dental Association, the following resolution was unanimously adopted:

"Resolved, That this Association, thru its officers, its Official Journal, the medical and dental press, its individual members and the proper legal authorities, bring to a definite aim the administration of anesthesia by unlicensed persons."

This resolution was necessitated by the fact that the abuse of unlicensed persons administering anesthesia had not only become prevalent, but was interstate in scope.

As the practice of unlicensed persons administering anesthesia is a menace to the safety of the community-at-large and as it is subversive of all legal control of intra and interstate practice of medicine and dentistry and the regulations of reciprocity, to the detriment of public interest, the following considerations are being laid before the members of the dental profession and their organizations for immediate action.

In 1911 the Ohio State Medical Board,

by resolution officially declared the administration of anesthesia a part of the practise of medicine, and declared unlicensed persons administering anesthesia as violators of the law. This resolution was supported by an opinion of the then Attorney General, and in 1912, on his further opinion, the law was amended to legalize the administration of anesthetics by licensed dentists in the practice of dentistry.

For some years exploiters of the nurse anesthetist continued to defy the Ohio State Medical Board, altho the Toledo, O., Academy of Medicine in 1911, gave two of its leading surgeons the choice of abandoning unlicensed anesthetists or being dropped from the organization. Suffice it to say the nurse-anesthetists were discontinued.

In August, 1916, the Ohio Medical Board, on petition of many well-known and reputable physicians and surgeons, withdrew recognition of Lakeside Hospital, pending its abandonment of the inuse of nurse-anesthetists and the teaching of anesthesia to unlicensed persons.

On October 2, 1916, an open hearing of this controversy was held in the Senate Chamber of the State House, Columbus, Ohio, and after listening to those concerned, the Board sustained its previous ruling, withdrawing recognition of Lakeside Hospital as an Acceptable Training School for Nurses.

On receipt of a signed statement, in December, 1916, from the Superintendent of Lakeside Hospital, that his institution would conform to the ruling of the Board, the hospital was reinstated on the list of Accepted Training Schools.

More recently, thru Mr. Howell Wright, newly elected state senator from the Cleveland, O., District, the hospitals of Ohio were circularized to secure sufficient support for introducing an amendment to the law legalizing nurse-anesthetists.

This medico-political activity met with the resentment of the entire medical and dental professions of the state and thru their Officers, Councils and Component Societies, over 90 per cent of the allied professions have discountenanced such an amendment to the existing law, and have notified their legislators to defeat it and have requested the Governor to veto it, should it, by any political maneuver, succeed in passing.

In 1916, a prominent surgeon of Louisville imported a nurse-anesthetist to administer anesthesia in his surgical clinic. On application by the Louisville Association of Anesthetists, the Attorney General of Kentucky, delivered an emphatic opinion that unlicensed persons administering anesthesia were practicing medicine within the meaning of the law, and were subject to its penalties.

On October 24, at its Hopkinsville meeting, the House of Delegates of the Kentucky Medical Association, thru a unanimously adopted report of its Committee on Ethics declared the nurse- anesthetist unethical, her employer not in good standing and urged the members of the Association to boycott hospitals employing nurse-anesthetists.

To finally adjudicate the legal status of the nurse-anesthetists, the following agreed case has been set for trial in the Louisville courts: Dr. Louis Frank and Margaret Hatfield vs. The Kentucky State Board of Health. This case will be tried very shortly and will then be reviewed on appeal by the Supreme Court.

Dr. A. T. McCormack, Sec'y of the State Board of Health of Kentucky, thru the Attorney General, who will represent the Board, will be permitted to introduce personal opinions, resolutions, etc., in respect to the administration of anesthesia, and in this connection the following set of tentative resolutions have been prepared and are being circularized to every authoritative source of medical and dental opinion and influence thruout the United States and Canada.

As the adjudication of the legal status

of anesthesia and the nurse-anesthetist not only affect the public weal, but also the vital interests of all physicians and dentists who have conformed to the educational and legal requirements of the state and interstate practice of their professions, it is to be hoped that dental specialists in anesthesia will immediately forward an opinion in the matter to Dr. A. T. McCormack, Bowling Green, Ky., and that all dental organizations, meeting in the near future will endorse the following resolutions, sign them and have their action attested by notary, so that it will be in legal form for use in court, and return copies to Dr. McCormack at the earliest possible moment.

RESOLUTIONS.

Whereas, the State Board of Kentucky, on agreement, is proceeding before the courts of Kentucky, to establish the legal status of unlicensed and nurse-anesthetists; and

Whereas, the historical evolution of anesthesia owes its past and present progress, absolutely and exclusively to the discoveries, researches and practices of qualified physicians, surgeons and dentists; and

Whereas, present and future progress in the science and practice of anesthesia depends entirely on the activities of the medical and dental professions; and

Whereas, many organized associations of licensed anesthetists (physicians and dentists), in co-operation with the medical and dental professions, have been and are now assuring the present and future progress of anesthesia; and

Whereas, all members of the medical and dental professions, administering anesthesia, have conformed to all established requirements of the law for the legal control of medicine and dentistry by licensure and certification to practice; and

Whereas, the administration of anesthesia is a vital, integral and exceedingly dangerous phase of the practice of medicine, surgery, dentistry and their specialties; and

Whereas, the safe and successful administration of anesthesia requires knowledge and skill only possessed by licensed and certified physicians and dentists; and

Whereas, making the anesthetist legally responsible for the outcome of the anesthesia admistered, is the only effectual way of protecting the community at large and the lives of patients coming to operation from incompetents, negligence and extrahazard; and

Whereas, restricting the administration of anesthesia to licensed physicians and dentists is in conformity with the legislative policy of other civilized governments and the ethics of all important foreign and American medical and dental Associations; and

Whereas, such restriction is in conformity with the legal decisions of foreign and American courts of last resort; and

Whereas, such restriction is necessary to protect state insurance funds under workmen's compensation laws, as well as employers, the charitable trust funds of hospitals and surgeons themselves from being mulcted of punitive damages in case of anesthetic fatalities or accidental injuries under anesthesia; and

Whereas, permitting nurses to administer anesthesia, (except in emergencies, without conforming to the same educational and legal requirements as are demanded by law of licensed medical and dental anesthetists and without similar individual, legal responsibility, is reprehensible class discrimination in the legal control of the practice of medicine and dentistry and is subversive of all interstate regulations for reciprocity; and

Whereas, nurse anesthetists have no standing or membership in the component organizations of the medical and dental professions and are not recognized by the associations of anesthetists, and

cannot, therefore, participate in the present or future progress of anesthesia; and

Whereas, the inauguration of a new era of anesthesia with the nurse-anesthetist as its chief protagonist would introduce so disastrous as economic menace to licensed specialists, by underselling their services, as would compel them to utterly abandon the teaching and practice of their specialty, and the advancement of the science and technic of anesthesia; and

Whereas, the exploitation of nurse-anesthetists is an effort on the part of certain hospitals and surgeons to compel licensed anesthetists to submit to socialization in the practice of their specialty, on the basis of a nurse's salary, which will not enable them to make a living or maintain their ethical standing; and

Whereas, the surgeons implicated in this effort refuse to be socialized in the practice of their specialty on a similar basis; or to permit nurses to infringe on the practice of surgery without conforming to legal requirements; therefore, be it

Resolved, That the.....
.....hereby endorses the action of the State Board of Health of Kentucky, in proceeding under the law to conserve the specialty of anesthesia as an inviolable and integral part of the practice of medicine and dentistry for the benefit and protection of the people of the Commonwealth of Kentucky; and in behalf of the rights and privileges already accorded licensed anesthetists, who have conformed to the provisions of existing laws.

The.....also endorses the efforts of the State Board of Health of Kentucky, in proceeding under the law, to compel all those who practice the specialty of anesthesia to comply with identical educational and legal qualifications for licensure and certification to practice medicine or dentistry or to secure interstate reciprocity. Be it further

Resolved, That copies of these Resolutions, duly signed and attested before a notary, be forwarded to Dr. A. T. McCormack, Sec'y of the State Board of Health of Kentucky, (Bowling Green, Ky.,) for transmission to the Attorney General and submission to the trial and Supreme Court of Kentucky, during the adjudication of the legal status of the unlicensed and nurse-anesthetist.

(Signed)

.....

Attested. Sec'y.

It seems a pity that this activity is necessitated, but unless a favorable decision is secured in the appeal to the Kentucky Supreme Court, the specialty of anesthesia, as an inviolable part of the practice of medicine and dentistry will go into the discard, and the whole legal control of the practice of medicine and dentistry will be imperiled.

ILLINOIS.

A bill now pending before the Illinois legislature provides that about a hundred boards, commissions and bureaus shall be consolidated into nine principal administrative departments.

Professional men generally were greatly concerned over the status of the various examining bodies. The dentists took the matter up with Governor Lowden, and after a couple of conferences were convinced the interests of the profession would suffer no harm. The state dental society is giving the bill its support.

Physicians, dentists, nurses, opthalmologists, pharmacists and barbers are grouped under the department of registration and education. Each profession and trade will retain its examining board, which will report results to the director who in turn will issue and register licenses. The director of the department will appoint the members of the various boards. The legislative committee of the state society was assured it would be asked for suggestions when appointments are in prospect.

This proposed legislation is known as the administrative Code Law for Illinois.

From present indications it will become a law before this item appears in print.

An Innovation.—Chicago has given further evidence of her right to claim "I Will" as the city's slogan. The seven day period from December 4th to 11th was proclaimed "Dental Week" by Mayor Thompson. Commissioner of Health Robertson managed this campaign for conservation of children's teeth, the shibboleth being, "Give Our Boys and Girls a Fair Chance."

Dr. Robertson enlisted the active cooperation of Superintendent of Schools Shoop, and the faculties of the several dental colleges.

The names of numerous men conspicuous in the councils of the State Society appeared as members of the Advisory Committee. The thought suggested itself that some of these incubated the idea in the first instance.

The propaganda was launched to give forceful impetus to a growing recognition of the necessity of conserving the teeth as a health adjunct.

The week's program consisted of a public rally at which notable dental authorities spoke; lectures in the schools followed by tooth brush drills; inspection of the children's mouths at the school clinics and dental colleges; tooth brushes and cleansing agents were distributed; the daily papers carried articles written by dental authorities covering the educational phase of oral hygiene.

This big idea measures a stride of considerable consequence in the right direction, and directs attention to several outstanding facts.

For many decades the men of the profession have been preaching the gospel

of a clean mouth to the adult generation with more or less wide-spread results—mainly the latter. Progress has been consistently discouraging and distressingly slow. In the main, applications for dental services were grounded in cosmetics and in calamity. Relatively few were attracted by motives of health conservation. The reason is readily uncovered. It is the ancient story of the old dog shying at the bag of new tricks. He knows the human race has successfully survived the ravages of oft repeated war, famine, pestilence and the thousand other ills "that flesh is heir to" thru countless ages. He knows he is here—as was his father and his grandfather—and so on ad infinitum. He, like the others, somehow passed thru the various ages of man. Tooth trouble? Yes, occasionally, but had it "yanked" or filled and so was comfortable again. He will listen respectfully to your discourse on teeth and health, but in the light of his experience and reason he knows better. You were aware your words carried no conviction to him. You were not discouraged for now and then the seed fell on good ground. These have multiplied many times—the harvest is at hand.

Several things have happened. Recognition by the medical profession that many bodily ills are traceable to mouth conditions is one important result. A change in our educational policy within a few years has had much to do with hastening the long strived for awakening. We at length began with the school children and successfully established the relation of oral conditions to physical and mental ills. Then another forward step was taken. Wisely we concentrated our efforts in inaugurating class-room instruction in things dental. We reasoned thus: children are impressionable; they absorb fundamental facts untinctured by the doubts of misread experience; a wholesome fear of that which may assail health grips them; the prospect of "catching" this or that disease—the germs of which are harbored in and around decaying teeth—fills their hearts with terror. They trust our opinions, put their faith in what is taught, accept the facts and are governed by them. And as the children of today will be the fathers and mothers of tomorrow it is apparent that we must place our reliance in school-room didactics in solving the problem of universal teeth and health education.

The success of the initial dental week by Chicago is indicative of a changing attitude among the adult citizenship. The importance of this movement can hardly be exaggerated.

Since the ground has been broken the profession should take advantage of the improved conditions to accomplish some definite results which promise to be widespread and lasting. No town is too large and surely none is too small to derive great benefits from a Dental Week. Local men everywhere should be equal to the task of bringing it about.

Reorganization and Attendance Records.—Dr. J. P. Luthringer, secretary and editor of the Monthly Bulletin of the Illinois State Dental Society, states that more than a decade has gone by since the Illinois State Dental Society formally recognized and adopted the principle or reorganization.

Matters of this character, like state legislation, are imitative to a degree and adoption of a process by one body is usually followed by similar action in others. Illinois broke the ground and its successful experiment gave an impetus to reorganization of state dental societies which has caused it to spread over the entire country, extending finally to the national body.

The magnificent result reveals itself in the inspiring information that twenty thousand members of the profession, almost fifty per cent of all in the country, have been enrolled in the various state societies. By the same token these same men have taken their places under the standards of the National Dental Asso-

ciation.

This makes a great society and it is going to be even a greater society if it is capable of discerning its own interests in orderly progress. Its record of the past gives abundant assurance that the future will be efficiently cared for.

The primal idea in the reorganization propaganda was to make both state and national bodies numerically representative of the dental profession. The wisdom of the idea that the stronger our forces the more swift and vigorous our action all will acknowledge. Action by such societies on all matters concerning the status of the profession and its further development and progress carries an authority which is impossible of attainment under conditions which make it incumbent on a few persons, relatively, to keep the organization going.

The creation of a large and powerful body develops a wider horizon and a greater destiny. Ever increasing responsibilities and new possibilities of achievement confront us. We must prepare to meet them. This dawning consciousness points to the necessity of an organization of stronger unity and wider and more definite co-operation among the individual members.

Numerically, we are strong, but something more than numbers is required to accomplish worth while and lasting results. That "something" may be defined as the "punch" which will come from more widespread interest and devotion to the profession thru fostering and developing of the co-operative spirit among the members.

This work must find its beginning in the state societies. We offer no plan defining the manner of accomplishing this, but a study of the attendance records of our state society will not only disclose a wide field for activity, but at the same time indicate a starting point in such a propaganda.

We take it that the attendance at the annual meetings is fairly indicative of the sincere interest the members generally have in their profession. Based on the entire membership the following table shows the per cent of attendance for the various years since the reorganization.

Year	State Meeting. Present at
1905	33%
1906	27%
1907	20%
1908	29%
1909	23%
1910	30%
1911	36%
1912	30%
1913	27%
1914	*No record
1915	25%
1916	26%

From the above table it will be noted that the percentage of attendance at the state meetings has been practically stationary since the reorganization.

Back of the state society are the component bodies. Grouping these according to the number of meetings held each year, a study of their activities throws an interesting sidelight on the number of representatives the various groups send to the annual meeting.

A glance at the roster published on the last page of the Monthly Bulletin reveals twenty-seven component societies. Closer scrutiny discloses a marked variation in the frequency of yearly meetings. Exclusive of the Chicago Dental Society only five meet monthly—that is for a period of nine months; one meets quarterly; nine hold three meetings; six meet semi-annually, and five annually.

The thought was suggested that the number of local meetings was reflected in the attendance from the several groups at the state meeting. Accordingly, in an idle hour we delved deeply into the problem with the following result:

Based on the number of component

*Fiftieth anniversary. No attendance records were kept.

meetings for each year the appended table shows the percentage of representation at the annual state gatherings for all local components, except the Chicago Dental Society, from 1905 to 1915, both inclusive, but exclusive of 1914, the fiftieth anniversary meeting.

Number of Meetings	Per Cent Attending State Meetings
1 per year	32%
2 per year	36%
3 and 4 per year	43%
9 per year	50%

Extended analysis is unnecessary. The inference is plain that the greater the activity of the local units the more interested are the members in the parent body, and that means more interested in the profession as well.

Early in our vocational career we were made acquainted with the phenomena of "periods of growth and periods of rest" in nature. Societies experience a similar process. As previously stated a dozen years ago the Illinois State Dental Society evolved a plan of re-organization which served to finger-post the way to better and numerically larger societies for the other states. Our period of growth beneficiently scattered germinating seeds thruout the land. During our period of rest we have gratefully observed each one as it grew and bore fruit.

As with laudable satisfaction we contemplate the result of our efforts, the conviction must come to us that we should gird up our loins and again enter the fray. In the next period of growth may we not also be the pioneers in blazing another trial by evolving a plan to thoroly vitalize the esprit de corps of our organization and give it greater unity, cohesion and solidity? A plan that will inculcate in the individual member a respect, devotion and enthusiasm for his profession aside from its expediency as a means of livelihood. The field, practically unbroken lies before us. We believe we have a number of thoughtful men with the genius to work out the necessary plans.

Comment on this measurably undeveloped phase of our growth is made for the development of opinion which will set forces in motion to bring about a consummation devoutly to be wished.

OHIO.

Public Health Notes—The following table, compiled by the Ohio Society for the Prevention of Tuberculosis, shows the "batting average" in the contest with tuberculosis in Ohio during the past seven years:

Population	Year	Deaths
4,418,253	1909	6,844
4,779,981	1910	7,719
4,841,710	1911	7,093
4,903,439	1912	6,764
4,965,169	1913	6,571
5,026,898	1914	6,564
5,088,621	1915	6,668

In commenting on these figures a Society bulletin, issued in January, says:

"From this record we are justified in the statement that there has been a decline both absolute and relative in the tuberculosis deaths in Ohio. The decline it is true is not great, but it is sufficient to give hope that in the next period of seven years we should see a slightly greater decline."

Why Not in Your City.—Free medical and dental clinics in public schools were advocated by School Superintendent John H. Francis, of Columbus, in an address delivered recently before the Columbus Dental Society.

"Physicians and dentists must volunteer their services to get such work started," Dr. Francis declared. "But when things are running smoothly, everyone should be paid. School clinics cannot be operated successfully for an indefinite period by those who donate their services."

The superintendent explained the free clinics of the Los Angeles school system, of which he was the head before coming

to Columbus. Liberal expenditures by the Los Angeles school board, for free clinics yielded a return hard to calculate, he said.

Mr. Francis' suggestion is good. Our new state school code makes it possible for boards of education to employ school medical inspectors. But, in the great majority of cases, funds are not available, and would not be so spent if they were, as the public has not been educated to the value of this demonstration. If the work is carried on thoroly, the results will quickly "speak for themselves."—The Ohio State Medical Journal.

SOUTH DAKOTA.

Notice of the Members of the South Dakota Dental Society.—At last year's meeting, the society unanimously voted to affiliate with the National Dental Association. At that time, the dues for each member was one dollar. Beginning with the first of the year, the National Dental Association dues had to be raised to two dollars for the reasons which you all are familiar with. Now the treasurer had only a small balance from last year's meeting, so the dues from the National Dental Association cannot be sent in to the general secretary until after the different districts have sent in their State dues to the state secretary. This is very important and should be attended to at once. The state secretary, Dr. Elmen, has sent in the names of 147 members who were in good standing to date, and these 147 should be receiving their monthly copy of The Journal of the National Dental Association. Those not receiving the same, are not in good standing.

Your attention is also called to the fact that the state dues were raised at last year's meeting to $5.00 per member. The district secretaries will please bear this in mind.

Remember the dates of the next meeting are April 26-27, to be held at Sioux Falls. Among other things, the program will include clinics and papers on Root-canal work; Sterilization; Extracting and Anesthesia; X-Ray work; Oral Prophylaxis; Impression taking, etc. Without a doubt, this will be the best meeting ever pulled off in Sioux Falls. Come.

FERDINAND BROWN,
Chairman Publicity Committee.

TENNESSEE.

Golden Jubilee Session.—The Tennessee State Dental Association will hold its Golden Jubilee Session in Memphis, June 19, 20, 21 and 22. This will undoubtedly be the greatest meeting ever held in this section of our country, as all of the committees are perfecting plans that will insure an extraordinary meeting.

The local committee has secured the Scottish Rites Cathedral. It has a cooling apparatus similar to the one at the Rathskellar that we all enjoyed so much in Louisville last summer. The air is gently drawn over tons of ice into the audience room and as it becomes warmed and rushes to the upper part of the chamber it is drawn off by suction fans. The room is sound proof, altho it is situated on a quiet street, traversed almost wholly by rubber tired vehicles. It is just outside the heart of the city, reached by two street car lines, passing within a block of the building. We expect to run a line of automobiles from the Hotel to the Cathedral building (where the meeting and exhibits are held) for both morning and evening session. Lunch will be served from the large kitchen of the Cathedral.

For entertainment of the members there will be a moon-light boat ride on the "father of waters;" a banquet and an automobile ride thru our beautiful parkways—the only one of its kind in the South.

The ladies will be taken care of from the moment they arrive until kissing their new found friends good-bye, and we want all the ladies to be here. This being the first thing of its kind that was

ever held in Tennessee we are expecting a big crowd and are making arrangement to entertain them highly.

The exhibits are far ahead of the usual, occupying one whole floor of this immense Cathedral building. I might also say that the "Dental Manufacturers' Club" have taken all matters pertaining to exhibits over. They will all be here and in the very best of style. They propose to make it the best exhibit of Dental necessities that has ever been shown south of the Mason and Dixie line. Mr. Stinson, their business manager, is showing great enthusiasm in the matter.—D. M. Cattell, President, Memphis, Tennessee.

NEBRASKA.

The Nebraska Dental Journal says:—"We feel that this issue of The Journal would not be complete without a word reminding Nebraska dentists of their privilege in boosting the Dr. Black Memorial. The Iowa Bulletin in its appeal declares that Iowa's claim on Dr. Black is second only to that of Illinois. We are not going to start an argument with Iowa, but, if we had the gambling spirit, we would wager that Nebraska has as large a percentage of her dentists following the teachings of Dr. Black, as any state in the Union. What have you done about it? What are you going to do about it? Send your check to Dr. Wm. H. G. Logan, 29 E. Madison St., Chicago."

TEXAS.

Army Dental Corps Resolutions.—At the meeting of the Southwestern Dental Society held at El Paso, Texas, January 22, 23, 24, 1917, the following resolutions were adopted and approved, relative to the enactment of a bill to be presented before the Congress of the United States, that the same may become a law, said bill being "The bill as endorsed by the National Dental Association July 27, 1916."

Considering the advancement obtained in the science of Dental Surgery, especially that during the last decade, during which time this branch of surgery has advanced to the front ranks and upon an equal plane with that of Medicine and Medical Surgery, and deserving as its reward a recognition of its accomplishments and achievements by the government of the United States.

Be it resolved, that this society gives its hearty support in every way possible to the enactment of said bill by the Congress of the United States of America so that the same becomes a law, thereby elevating the profession of Dental Surgery within the Army of the United States upon an equal plane with that of Medical Surgery, a reward which it so truly and richly deserves.

Be it further resolved, that a copy of these resolutions be forwarded to the Secretary of the National Dental Association, and the President of the Association of Military Dental Surgeons, and to any other person, society or body known to have the good interests of the profession of Dental Surgery at heart.

Adopted and approved at El Paso, Texas, this 22nd day of January, 1917.

Signed: FILLIARD S. SAMPLE,
M. F. BAUCHERT,
G. HUDSPETTE,
Committee on Resolutions.

MICHIGAN.

Dental Inspection.—Out of 92,029 school children examined in the city of Detroit in 1915, 81,906, or 88.9 per cent, suffered from defective teeth to an extent that required some form of treatment. Defective teeth impair general health and impede school progress. Disorders of the digestive tract, tuberculosis and various other diseases frequently are preceeded by diseased conditions in the mouth. There is a direct relationship between dental development and mental development and it is absolutely essential to good work in schools that children's teeth be maintained in a healthy condition. The Detroit Board of Health rec-

ommends that a good tooth brush be included in the list of New Year's presents for every Detroit child and that its use be made a part of the daily training. If this recommendation is carried out Detroit will have more healthy children this year than last and their chances of growing up into useful, healthy men and women will be increased.—Detroit Board of Health. The Michigan Dental Journal.

CALIFORNIA.

Prophylaxis means to prevent or ward off, especially disease. Then in the application of this principle in dentistry we would prevent or ward off a disease of the teeth or the adjacent tissues.

The practice of prophylaxis has been most thoroly impressed on the minds of the members of the profession during the last few years, and yet it would not seem amiss to again call to our minds the real breadth and scope of that branch of our work.

It is appalling to know of the lack of knowledge of this work, both in its application and value. The writer recalls a meeting of the State Association, not so many years ago, at which time a clinic was being conducted in oral prophylaxis. The doctor had very carefully and thoroly cleaned and polished the teeth of one-half the mouth, holding the other for comparison. It was well done, and the point in the case was well developed. To stand near by and hear such exclamations as: "Is it possible?" "My, I had no idea that such could be done!"—these are the things, too often heard said, and after having heard them, a man with any desire for or interest in better dentistry wants to scream.

Thru prophylaxis all deposits are carefully removed from the surfaces of the teeth, by means of instruments, and these surfaces later polished. A warm physiological salt solution used as a mouth wash for a few days aids recuperation of the soft tissues.

Thru prophylaxis a close watch is kept of the mouths of our patients. The first time a mouth is observed a careful examination is made in order that any sign of inflammation may be detected. This slight area of inflammation may be due to deposit, overhanging margin of a filling, misfit crown, or any one of a number of things. In the beginning is the time for discovery, for in this stage it is wholly curable. Following Black's thought in this condition, there are four stages of inquiry of the investing tissues:

1. Gingivitis—Inflammation of the soft tissues, due to some foreign object, salivary calculus, etc.

2. Pericementitis—If this cause be not removed encroachment of the calculus goes deeper and deeper until the pericemental membrane is reached, and causes an inflammation of that tissue.

3. Suppurative Pericementitis—As the condition progresses attachment of the peridental membrane is broken, the septal tissues are absorbed—pockets containing pus are the result.

4. Chronic suppurative pericementitis—The final condition of things—one of long standing and in which cure is doubtful.

Causes of this condition are:

A. Calculus.
   1. Salivary.
   2. Serumal.

B. Injuries.
   1. Irregularities.
   2. Lack of contour.
   3. Lack of contact.
   4. Overhanging margins of fillings.
   5. Misfit crown.
   6. Undue pressure about the teeth, e. g., partial denture.
   7. Ligatures.
   8. Carelessness in the use of clamps.
   9. Carelessness in the use of brush-wheel by the dentist.
   10. Etc., etc.

Prophylaxis then has a very wide scope, and we must learn to think beyond the ordinary procedure of scaling and brushing the teeth. We must THINK in every operation. Contour and contact

must be obtained in every case, else the value of the operation is nil. And in order to obtain perfect contour and contact, proper cavity preparation is essential.

And so it is with the man who takes advantage of the opportunity of such a series of lectures as was delivered last week, under the University Extension Division, means of best accomplishing that which he would practice, are placed in his hands.

Marshall says: "Clean teeth do not decay," and here again is the prevention of disease, while prophylaxis or cleansing the teeth may not prevent 100 per cent of caries it will greatly retard.—LET US PRACTICE PROPHYLAXIS IN ITS BROADEST SENSE.—Editorial in The Bulletin of the California State Dental Society.

DISTRICT OF COLUMBIA.

National Capital Dental Society of the District of Columbia.—On February 6th, 1917, the National Capital Dental Society held its regular monthly meeting in the Chamber of Commerce, Washington, D. C., to which all ethical practitioners in the District of Columbia were invited.

A paper was read by John G. Hemmeter, M. D., PhD., L. L. D., Director Laboratory of Physiology, from the University of Maryland, the subject being "The Relation of Internal Secretions to Calcium Metabolism and Dentition." This paper was an able one, and was listened to by a large gathering of the most prominent members of the dental profession in Washington, D. C.—Starr Parsons, Secretary, Washington, D. C.

COLORADO.

Dental Department Woodmen Sanitarium.—The dental department is located in a bright sunny room in the south side of the receiving hospital. The furniture and fixtures are of gray enamel and are the latest and best procurable, consisting of an American cabinet with sterilizer and especially constructed glass front so that all compartments may be tightly sealed and sterilized by formaldehyd gas. The chair is an S. S. White Diamond, as are the engine and cuspidor and are known as the S. S. White Unit. The motive power is electrical, consisting of engine, sterilizer, electro dental switch-board with mouth lamps, cauteries, root drier, etc.

Immediately after a patient is admitted and has had his physical examination, he is sent to the dental department for examination, where a chart is made and kept of each month, and this chart shows at a glance the condition of the mouth, also how many and position of decayed, extracted, filled, crowned, bridged or worn teeth, the condition of the chewing surface and condition of the gums in regard to tartar or pyorrhea.

After a mouth has been thoroly examined and chartered an appointment is made for the earliest possible date. Sometimes we have to wait from a few days to several weeks before a patient is strong enough to undergo any great amount of work. As soon as possible, however, a date is set and then begins the work of putting the mouth in as good a condition as is possible.

We find that about 90 per cent of patients have pyorrhea alveolaris, so the treatment of this and cleaning is the principal dental work done here. Our treatment for pyorrhea is to plane and polish each affected tooth surface until it is so smooth that should a microbe chance to light on one of these polished surfaces he would probably slip and break his neck.

We do not do any gold work, either in the way of fillings, crowns or bridges, or plate work. However, we do as much repair work as possible in the way of amalgam or silver and cement fillings; also, teeth that need the pulps (nerves) removed are treated. In this latter connection we find the X-ray of great service, as it shows us the exact positions of all root canals, and after the work is done, if all roots have been filled to their

ends. The X-ray is also of great value in finding blind abscesses at the ends of roots. By the way, we find about 90 per cent of teeth with dead pulps show more or less trouble at the apices of the roots.

The bacteriological laboratory is also of much benefit to us in determining the exact character of much of our troubles and infections. Nearly every patient admitted is in need of more or less dental work, probably averaging about six hours to the patient. Some few need none, and others a great deal, especially by way of phylactic and pyorrhea treatment.

A great deal of time and money is spent by the sanitarium to have everything in the way of food in the most sanitary condition. Dishes and silverware are sterilized; the milk put thru three or four processes until everything is taken out but the milk, and it is as clean as it is possible to get it; all cooking is supervised to see that there is no chance of carrying infection. But, of what use is all this work and expense, if, the last thing before it goes to a patient's stomach, it is contaminated by passing thru and being mixed with the filth of an unclean mouth.

We have on record a good many patients that have shown marked improvement after having pyorrhea pockets cleaned up or abscessed roots treated or removed. Case 2701 had run considerable temperature for five months. After an X-ray picture was taken of two suspected teeth, which showed blind abscesses, the teeth were removed and the patient has improved steadily to date. Case 2893 had been confined to the hospital for more than two months. Since removing three old roots and starting treatment for pyorrhea, this case has improved enough to be sent out in one of the colonies. In the treatment of pyorrhea the Carr instruments are used almost exclusively.

Of course it makes no difference how much time and careful effort is put in on the work of cleaning up a mouth, if the patient does not do his part by keeping it clean—the work will eventually fail—so that at the completion of each case the patient is given instructions of how to care for his mouth.

Now, we positively do not claim that the removal or cure of abscessed roots or the cleaning up of dirty pyorrheal mouths is a cure for tuberculosis, but we do think it is a material benefit as an adjunct to the general treatment that is given our neighbors at this institution. —C. S. Kramer, D. D. S., Colorado Springs, Colo.

CHICAGO.

The fifty-third annual clinic of the Chicago Dental Society has passed into history. Twenty-five hundred dentists in attendance declared it equal, if not the superior, to any of the great meetings of this—the largest local dental society in the world.

A wealth of oratory from the profoundest scientific discussions to the brilliant wit and humor of the entertainer was here in abundance. There were clinics which need take second place to none that have ever been given before the dentists of this broad land. Exhibits of the very best were open during the entire time of the meeting. Conferences which threshed out the knotty problems that affect not only this society but the societies of the state and nation as well were in almost continuous session. A banquet, enlivened with music that will not soon be forgotten by the large assemblage which packed the banquet hall to its utmost capacity, was the crowning feature of this great occasion.

On Friday evening, January 26th, Dr. Joseph Colt Bloodgood, of Baltimore, presented a paper entitled: "The Pre-existing Lesions of the Oral Cavity and Their Relation to Malignant Diseases." It proved to be a masterly and scientific discussion of the great subject of cancer. So clearly and plainly was it presented that even a layman could not fail to comprehend it in all its details.

The cardinal points of the paper were:

first, that cancer can be cured; second, cancer is curable when recognized early; third, cancer is preventable. All of these, of course, with some limitations.

The essayist dwelt upon the prime causes of cancer in the mouth, the greatest of which are defective teeth and tobacco. Of 167 cases—four of whom were women—157 of the men used tobacco and three of the women used snuff.

In practically all cases of cancer in the mouth there is a warning long enough in advance that the cancer may be prevented. Leucoplacia, warts, persistent irritations will be present and will be known to exist by the patient from six months to seven years before the development of the cancer which can be prevented by the removal of these pre-existing lesions. It, therefore, becomes a matter of education along the lines of prevention, and the dentist should be on the watch for these signs. Examine the entire oral cavity and if lesions are found warn the patient rather than to simply carry out the work at hand.

The discussion was continued by Drs. L. L. McArthur, Arthur D. Bevan, Thomas L. Gilmer, Frederick B. Moorehead, Truman W. Brophy, A. J. Ochsner and Dean Lewis.

On Saturday the long list of ably prepresented clinics constituted a post graduate course in dentistry to all those fortunate enough to be able to see them. The enormous attendance necessarily made it difficult to comfortably view many of the clinics, but no practical way has yet been presented whereby this problem can be solved perfectly.

It is impossible to mention the clinics individually but from the interest manifested in a number of them the committee was able to determine what the dentist is anxious to see, and future clinics may be better able to supply that demand.

The crowning event of the entire meeting was the testimonial banquet in honor of Dr. Edmund Noyes.

Dr. George E. Vincent, president of the university of Minnesota, gave the address of the evening, and for speed, brilliance, wit, humor, earnestness, depth of thought and scientific reasoning all merged into one this country would have to be searched from end to end to find his equal. His address was on Crowd Psychology. For one hour at the rate of 250 words a minute, he poured broadside after broadside into the guests. He swept them with a curtain of fire, he spellbound the spellbinder, he convulsed his hearers with laughter and then plunged them into the deepest thought. He hypnotised them, but they were not asleep. Oh, no, they couldn't afford to miss such a wonderful address as that. The only casualty was the stenographer who tried to take a verbatim account of the bombardment.

Dr. Harned, of Rockford, spoke of Dr. Noyes and his splendid career in Dental society work, of his faithful and untiring service to dentistry and to humanity. Then our own Dr. Gallie outdid himself in a way that he alone can do. He toasted Dr. Noyes as the great good, noble, true, just, meek, kind, sympathetic and altogether lovable man. Nor did he forget Dr. Noyes' other and better half. He spoke feelingly of the sweet and beautiful character of Mrs. Noyes, who has walked side by side with her illustrious husband thru all these years.

Dr. Moorehead on behalf of the members of the Chicago Dental Society presented a beautiful silver service.

Dr. Brophy on behalf of the faculty of the Chicago College of Dental Surgery presented a loving cup.

Dr. Black presented an autograph book with the signatures of all the guests present.

Dr. Gilmer on behalf of the faculty of Northwestern University Dental School presented a silver cake basket.

Dr. Noyes replied in his modest and characteristic manner in a few well chosen and appropriate remarks.

The music of the evening by Mr. Carl Cochems was a recital program in itself. Mr. Cochems demonstrated his great

versatility by varying his program from the most difficult operatic to popular music.—Illinois State Society Bulletin.

CANADA.

The Medicated Dentifrice—Under no circumstances should the dental profession acquiesce in the general use of highly medicated tooth cleansing preparations. There is, doubtless, a place for the medicated dentifrice in the treatment of diseased conditions of the soft tissues of the mouth or abnormal conditions of the oral fluids. A medicated dentifrice, however, should be used only upon recommendation of a dentist and as part of the prescribed treatment in specific cases.

We have surely passed the patent-medicine cure-all stage in the diagnosis and treatment of dental disease. Manufacturers may safely leave these matters in the hands of the practising dentist. The natural inference to be drawn from the press announcement of some dentifrice manufacturers, leads the average citizen to the conclusion that all the dental ills of humanity have a common origin in precisely similar conditions, that these conditions are invariably found in every mouth, and that there is but one perfect cure and preventative,—namely, the particular dentifrice in whose interest the advertisement appears. Dentists cannot recognize and certainly should not tolerate such nonsense. Diseased conditions of the teeth and investing tissues should be diagnosed and treated by the dentist. If the use of a medicated dentifrice is advisable the dentist will recommend it and not otherwise.

The time has certainly come when dentifrice manufacturers must be divided into two groups: The one composed of those manufacturing a simple, pleasant cleansing agent, and the other, those manufacturing a cleansing agent with strong drugs added. The former may properly appeal directly to the general public for support, while the latter should confine their publicity effort entirely, to a presentation of their claims to the dental profession.

Those of the latter group of manufacturers who have been appealing to the public, are most versatile in discovering the cause of dental disease. They ingeniously add one disease or condition after another, to the already long list of conditions "cured" by the use of their particular dentifrice. They remind one of an Indian Chieftain adding scalps to his belt. The whole matter is a serious business, tho it is amusing to watch the alacrity with which the above members of the "medicated group" follow a lead. One manufacturer adds Chlorate of Potash, and in a twinkling the others follow suit,—not that they believe that potassium chlorate is a good thing to add, but simply because they feel that without that particular drug they are at a disadvantage, and the other fellow may score. A little later the same spectacle was repeated with Emetine. One manufacturer claims that his dentifrice, when used in the mouth, is a germicide (tho he must know that if his claim is true the preparation is doing more damage to the mucous membrane of the mouth than to the micro-organism,) while the next man claims "germicidal efficiency," and, "if used regularly will prevent colds." How long is the dental profession going to suffer without protest, this vicious contest of cure added to cure and drug added to drug? Why should there be introduced into the oral cavity of the average healthy man, each time he cleans his mouth, drugs which only destroy or deteriorate the function of the tissue cells, and fail entirely to exercise a beneficent effect, the conditions indicating their use being entirely absent?

One manufacturer attempts to substantiate his germicide claim, by presenting an Analytical Laboratory Report. "We found," says the report, "that five minutes exposure to a 10 per cent solution of your tooth paste was sufficient to destroy the Staphylococcus Pyogenes Aureus entirely. These results therefore indicate

1000 per cent. germicidal effect produced by a 10 per cent. solution." How can such an experiment, performed in a test tube in the laboratory, honestly compare with results in the oral cavity, with its constantly flowing saliva? One might as well compare the sterilization of quiescent water in a tub by the addition of Phenol, with the result of an equal quantity of the drug thrown into the River Niagara. As a matter of fact it is the flowing saliva that saves the situation for many of the medicated dentifrices. For the ordinary individual with a healthy mouth, all that is needed is a cleansing agent.—Editorial in January Oral Health.

Course in Public Hygiene.—The Bulletin Medical of Quebec states that the course of instruction in public hygiene for the diploma of expert hygienist opens in January at the Laval University, Quebec. Physicians are eligible to the course, the fee for which is $100. Further details will be supplied by the secretary of the medical department of the university.

Value of a Dental Nurse.—The Dominion Dental Journal editorially states that a dental assistant, to be of greatest value to a dentist, should be a good housekeeper above all. She should know when a dental office is neat, artistic, clean and healthful. She ought to be the ballast of the office, protecting the dentist from worrying things. She should stand between the outer world and the operating room, be suitably dressed, attentive to all the varying moods of the dentist and his patients, capable of answering the telephone, making appointments and dealing with the public generally.

A dental assistant must know how to care for dental instruments, and keep the whole dental equipment in running order. The stock and up-keep of materials and instruments are in her keeping. Upon her is placed the responsibility of the asepsis of the office and all the operations. She must know what surgical cleanliness means.

All filling materials and medicines must be ready for use at all times, and ready promptly at the right time, in the right order. Cements, amalgams, dressings, impression materials, trays and gold, should be prepared and ready for use when needed.

A well-trained assistant should be capable of caring for impressions, filling and separating models, preparing wax bites, vulcanizing and finishing dentures, making gold inlays from wax models, soldering a band or making a crown.

All the business of the office should be in her hands, from meeting and finding out who patients are, to the keeping of dental and financial records, collecting accounts, paying all accounts for rent, salaries, materials, equipment, laundry, telephone, gas, heat and light.

Failure in Teaching and Practice of Sanitation—Dr. A. E. Webster in the Dominion Dental Journal, says that—It takes time to learn to be moderately sanitary. Sanitary science has been taught in medical schools for over thirty years in this province. Hygiene has been taught in normal and model schools for over twenty-five years. There has been a Board of Public Health for the province for almost a quarter of a century. There have been local boards for about as long a time. Hygiene has been taught in schools, hospitals, churches and homes, for years and years. Teaching hygiene in Ontario has not been effective because many of those called upon to do the teaching don't believe in the general principles of sanitation for themselves, and those who do believe in it are not allowed to carry out their ideas because those who hold the money strings do not believe in sanitation.

The common drinking cup is not permitted in railway trains and other public places, except the legislative buildings in Toronto, right under the nose of the Provincial Board of Health. There the tin cup and the tap is good enough, except in the Assembly Chamber, where

real York Springs water and a cut glass tumbler meets the sanitary requirements of those who make the laws on this important matter.

In the only public school under the direct charge of the Government there is neither medical nor dental inspection, and the common roller towel has sway for all the boys.

Many of the boards of health think they have done their full duty when they have inconvenienced the public by doing away with the drinking cup and buying a drinking fountain. Many of the drinking fountains in use are far from being sanitary, while some are worse than the common drinking cup. There are drinking fountains in use all over the country where the water to drink spouts up thru water which has already fallen back from the lips of the drinker, or some previous drinker. In some of the public schools a fountain is in use which has a slow stream of water coming from the bottom of a glass cup. The children put their lips to the edge of the cup to drink. A man who was looking at this particular form of fountain for the first time, said: "Some people seem to have no sense." Boards of health send out instructions to boil the drinking water, and then the house wife washes the knives, forks and the dishes in the same water without boiling. Some stores refuse to exchange hair goods, but the same hat may be tried on forty people's heads. The roller is good enough for the customers who may not exchange a towel. Isn't it hard to have common sense about such matters?

Another Opening for Women.—A dental office without a lady assistant or a dental nurse is a place to be shunned. No dentist can afford to spend his time, and that of his patients, in doing the things which can be better done by a lady assistant. A dentist had better try to do without an electric engine than an assistant.

Until the technic of root canal treatment and filling reaches a higher state of perfection, more and more teeth will have to be extracted, with a consequent extension of prosthetic requirements. Besides this, the requirements of the army have long since absorbed almost all the available dental mechanics in the country, and the end is not yet. There is no good reason why women cannot do this kind of work, thus releasing more vigorous persons for the arduous duties of the war. Women might well do prosthetic dentistry for civil dentists, and for that matter, do the work in the stationary camps. It is true it takes quite a bit of training, but, since practically all the trained men are now engaged in military dentistry, why not train women for the future?—A. E. Webster, M. D., D. D. S., L. D. S.

Dental Surgery in the German Army.—The British Medical Journal reports that at a meeting of surgeons and dentists held a few months ago in Berlin, General Schultzen gave an account of the organization of the dental service in the German army. The work fell into two main divisions—the treatment of wounds of the jaw, which was the most important, and the everyday treatment of soldiers' teeth, including the making and fitting of artificial teeth, to render the men fit for active service or employment on war duties. The incidence of wounds of the jaw had, he said, far exceeded expectations, with the result that five dentists had to be attached to each army corps, altho, under arrangement made in 1907, only one dentist was provided for each. Dentists were appointed to military hospitals where adequate facilities were provided for skilled work, and were employed also to a certain extent nearer the firing line, when the fighting assumed a stationary character. In fracture of the jaw, the primary object of the dentist was to immobilize the fragments in order that the patient might be sent on at once to a special jaw hospital at home, where extensive

operations could be undertaken. About 1,000 dentists were employed by the army on the lines of communication and at home. The organization had worked smoothly. It had been hoped that, owing to the supervision and treatment of school children's teeth, the teeth of the recruit would be found on the whole to be sound. But between the school age and the military age there was evidently time enough for neglect of the teeth to provide plenty of work for the army dentist.—Editorial in Dominion Dental Journal.

FOREIGN.

Marksmanship and Alcoholism.—The American Medical Journal says that at a recent meeting of the Temperance Society of German Physicians, Kraepelin discussed the results of a shooting tournament held in the fall of 1908 under the direction of the Bavarian Ministry of War for the purpose of determining the influence of alcohol on marksmanship. Twenty carefully selected marksmen fired 27,000 shots in sixteen days. Previous results were confirmed, namely, that a single small dose of alcohol—in this case, 40 gm. or about the equivalent of 1 liter of beer—taken in the morning, had a detrimental effect on accuracy of aim five minutes later; the most pronounced effect being noted from twenty-five to thirty minutes after the liquor had been imbibed. The average loss in accuracy was about 3.1 per cent. The effect of the alcohol was not so great when taken after the noon meal, nor was it apparent as soon, confirming the belief that alcohol taken after a heavy meal does not have as injurious an effect as when taken on an empty stomach or after a light meal. In a few instances, marksmanship improved for a short time after the ingestion of alcohol; then it became very inaccurate, the loss in marksmanship being as high as 9, 10, and 12 per cent. in the case of eleven men. Self-deception, so commonly associated with alcohol ingestion, was evident in these cases. It should be remembered that the subjects of these experiments were in prime physical condition. Similar experiments made on soldiers in time of war would show still greater loss of accuracy since loss of sleep, over-exertion, insufficient nutrition and psychic disturbances would exert an unfavorable influence.

GENERAL.

Prohibition on Cocain and Opium.—The American Medical Journal states that prohibition of import, except under license, of cocain and opium, has been declared by the British government, according to a report from the United States Consul General at London in Commerce Reports Dec. 14, 1916. Cocain includes all preparations, salts, derivatives or admixtures containing one tenth of 1 per cent. or more of cocain, or liquid extract of coca containing a like amount of the drug. Opium includes any solid or semi-solid mixture containing opium.

Mouth Sepsis.—Considerable attention has been bestowed on oral sepsis as an essential etiologic factor in systemic infections, and there is reliable scientific evidence in support of the tooth-root theory of this large class of diseases. The fact that chronic septic foci in teeth and elsewhere are exceedingly difficult to recognize in the majority of cases, is undoubted. It is particularly instances of periapical infection or abscess that offer the greatest difficulty in this respect. Here, ever a Roentgen examination, which should always be made by an expert, may fail to render reliable aid.

Daland states that the diagnosis of mouth sepsis should be made by a dentist who is specially trained for this, in which opinion I concur. The physician, however, who encourages a case of systemic infection in which the teeth are suspected should refer the patient to a competent nose and throat specialist with a view to eliminating all foci other than those which may be present in the

mouth before invoking the services of the specially trained dentist. It sometimes happens that multiple foci are discoverable, in as many different organs, as the teeth, tonsils and sinuses.

Successful treatment of secondary systemic infection demands, first and foremost, the removal of the septic focus or foci on which they depend. Before reducing the masticating surface of a particular patient, however, the evidences of an existing necessity for so doing should be as clear and convincing as possible. An attempt by a competent dentist should be made to heal the morbid lesions in and about the tooth roots, since some of these are amendable to expert management, before ordering the extraction of the teeth.

Within the past six months a number of dentists have informed me that countless teeth are being removed without justification, on the advice of physicians, usually following a Roentgen examination (by amateurs in many instances.) In well authenticated cases in which one or two teeth were the seat of peripheral infection, physicians have gone so far as to give emphatic directions to the effect that all of the remaining teeth be extracted. For example, one of Philadelphia's best known specialists in extraction was requested by a physician to pull out all of a certain patient's teeth —twenty—but he courteously, tho firmly, declined to do so.

It seems to me that the rapidly growing custom of sacrificing teeth, many of which are merely suspected of being septic, cannot fail to arouse the most ardent activity of dentists in opposition thereto, and must prove the ultimate chagrin of the medical profession. It would appear that an amazingly low estimate is being placed on the value of human teeth by an increasing number of physicians, who should appreciate the importance of a good masticating apparatus to the digestive function—to the maintenance of health.

I do not mean to disparage the significance of these latent chronic septic foci as a cause of secondary systemic infections or to depreciate investigations in this, comparatively speaking, new field of endeavor. The object of this letter is to utter a word of warning with a view to lessening what I believe to be an unwarrantable present-day sacrifice of the masticating surface, and to spare the medical profession the adverse criticism of the future, by a broader conception proper to the subject of oral sepsis and its management in the present.- J. M. Anders, M. D., Philadelphia.—The Journal of the American Medical Association.

Dental Clinics in School Buildings.—The most important phases of the health problem are educational in character. This fact is recognized by every modern health officer. It is also recognized that health work must be carried on in the schools and that it is, indeed, one of the most important departments of public health effort. Some claim that the regular Health officer should have charge of this department of school work. Others, equally zealous for the best results, and anxious that cooperation should exist between teacher, physician and dentist, argue that this work should be in the hands of a special Health Officer working under the School Authorities. Both of these groups, tho they disagree upon this point, are quite agreed that health instruction cannot be disassociated from school instruction and routine.

The Forsyth Dental Infirmary of Boston is certainly unique in its conception and operation. It has been a great boon, to the children of Boston and to the standing of Dentistry, both in the immediate community and far beyond. However highly one may regard the work of the Forsyth Institute, however, one should feel in no way bound to advocate a similar method as the ideal plan for all large cities. Neither should one sit

in passive mood and do nothing for school children until some generous philanthropist comes forward, and makes a magnificent gift for the erection of a dental infirmary. Furthermore, the free discussion of other plans of organization and their comparison, should not be construed as a lack of appreciation of the really excellent work the Forsyth Institution is accomplishing.

A serious objection has been raised against the Forsyth plan, namely, that it has been developed quite apart from the regular school system. The difficulty and expense of the transportation of children long distances to a central clinic and the probability of lack of permanent co-operation between teacher, parent and dental officer where oral hygiene is not a part of the regular school work, makes the scheme of a dental clinic in every school building a much more practical plan. Such is the ideal to which the city of Toronto is working in its dental effort for the boys and girls of school age. Fifteen dental centers have been organized in as many schools, located thruout the city, and each is an integral part of the school organization. The school Dental Officers are subject to the same discipline, as to attendance, etc., as are members of the teaching staff.

In recent issue of the Scientific American an article appeared under the title "Boston's Care of School Children's Teeth," in which the plans and work of the Forsyth Infirmary were described. The article also stated why the plan of a central clinic was considered an advantage over the establishment of a number of clinics distributed thruout the city. To quote:

"Unlike the medical practitioner, the dentist requires a complex equipment in order that he may work effectively. The multiplication of isolated dental units necessitates the duplication of many parts outside the chairs and the instruments of general application. Moreover, no form of professional activity offers more opportunities for the transmission of disease from one patient to another; hence the most rigid asepsis is an essential of dental work. A central plant, where the sterilization of everything that enters the mouth is under the control of an individual whose sole business this is, furnishes a more complete check on infection than the most conscientious divided effort in a multiplicity of small plants can possibly achieve. * * * * * On all grounds it is wiser and more practicable to bring the children to the dentist than to bring the dentist to the children. The child's time does not begin to be worth as much as the dentist's; and the element of time apparently lost to education can really be ignored, since it is repaid many times in the ultimate outcome."

The question is not the relative value of the time of a child compared with that of a dentist. It is rather a question of the value of the time of all the children the dentist works for. Under either plan the dentist wastes no time. It is just as easy for him to report at a given hour at a local point as at a Central Infirmary. The point is that we cannot hope to secure the cordial co-operation of school teachers, if the demands of oral hygiene compel the frequent absence of a number of children from school for extended periods, owing to the distance to be traversed in reaching a central clinic. This difficulty is reduced to the minimum by having the dental clinic situated in the school building.

Is there more danger of infection by keeping these children within the school and attending to their dental needs at the school clinic? Certainly not. If the school dental officer follows a correct technic and is an earnest, careful graduate, he will practice aseptic dentistry and there will be much less danger of infection than in assembling all the children of the city at a central point.—Editorial, Oral Health.

ORAL HYGIENE.

Writing in "Frocks and Frills" for the Baltimore Sun in a recent edition of that paper, Miss Emily E. Lantz, editor of "Frocks and Frills," has the following of local interest:

"A Soldier or Sailor is No Better Than His Teeth."

"While meditating upon the thing Baltimore needs for 1917, a news paragraph catches the eye. It is in effect that Boston, Mass., on January 20, 1917, members of the dental profession will present a silver loving cup to Mr. Thomas A. Forsyth, who has given to the city in the Forsyth Dental Infirmary for Children the first institution of its kind in the world. It is an infirmary where the teeth of children are examined and treated free of charge and where the public is taught the close relation between sound teeth and health and instructed how to take care of the former. Oliver Wendall Holmes has said: "The dental profession has established and prolonged the reign of beauty; it has added to the charms of social intercourse and lent perfection to the accents of eloquence; it has taken from old age its most unwelcome feature, and lengthened enjoyable human life far beyond the limit of years when the toothless and purblind patriarch might well explain, 'I have no pleasure in them.'"

In addition to the gift of the building, an endowment of $2,000,000 will be provided for the maintenance of the Forsyth Dental Infirmary. Outwardly, and in the interior, the building is architecturally beautiful. It is equipped with every facility that dental science demands, and there is a garden where children, awaiting treatment, may play. There is also a waiting room, airy and cheerful, where decorative panels of the walls picture Browning's story of the Pied Piper of Hamelin, Washington Irving's tale of Rip Van Winkle, the classic narrative of the Argosy and the Golden Fleece and the diverting folk tales of the Dorchester Giant.

In this great training school for physical national preparedness Maryland has a part because the subject of oral hygiene in relation to school children was first introduced in 1900 by Dr. Richard Grady, formerly of Baltimore, and now dental surgeon of the United States Naval Academy at Annapolis. Dr. Grady was also the organizer and for many years the director of the Baltimore Polytechnic Institute, the first school devoted to manual training in America. Among his dental associates he is known as the "father of the national mouth hygiene movement" and quite fittingly he delivered at the Forsyth Infirmary on December 10, the first of the course of free lectures to be given by eminent men upon subjects relating to public health.

Dr. Grady's preparedness idea is that no soldier nor sailor is better than his teeth. His dental creed is "Good teeth, good health, with the logical explanation:

> Without good teeth, there cannot be thoro mastication.
>
> Without thoro mastication, there cannot be perfect digestion.
>
> Without perfect digestion, there cannot be proper assimilation.
>
> Without proper assimilation, there cannot be nutrition.
>
> Without nutrition, there cannot be health.
>
> Without health, what is life?
>
> Hence the paramount importance of the teeth.

It is infinitely more vital to teach children this than the free-verse rendering of the immortal tale concerning the "House that Jack Built."

The public is thoroly alive to its duty toward the child in developing its mind, yet of equal importance is the development of its body. The child with neglected teeth suffers inferior physical development. Baltimore requires no sys-

tematic examination of the teeth of children admitted to the public schools other than that incident to the physical examination made by health officers, and there are free dental clinics to which attendance is voluntary. Yet here is a dental infirmary already provided in Boston. It is said in dental circles that thru the munificence of a private citizen, Rochester, N. Y., is soon to receive an endowment of $1,500,000 to establish a Rochester Dental Dispensary, and that a California believer in national preparedness is to endow a similar institution in the West.

The Baltimore College of Dental Surgery was the first to be established in the world. It really does seem as tho some Maryland magnate might establish, during 1917, an infirmary for oral hygiene in Baltimore.

The committee in charge of the presentation of the Forsyth Loving Cup and Banquet have selected Dr. Grady to represent the State of Maryland as a member of the honorary committee as it will appear on the menu at Hotel Somerset, Boston.

NAVY DENTAL CORPS.

Medical Department.—The recent examination of thirteen candidates for appointment to the Navy Dental Corps has been concluded with the result that four appointments will be made to that branch of the Naval Medical Department. The following named have been passed:

Dr. G. C. Frazer, 1424 R. St., Washington, D. C.

Dr. A. W. Chandler, 717 Highland Ave., Newark, N. J.

Dr. Rufus A. Ferguson, Sandy Level, Va.

Dr. Carl S. Ziesel, 45 N. 3rd St., Camden, N. J.

ARMY—STANDARDIZATION OF ALL MEDICAL AND SURGICAL EQUIPMENT.

Council of National Defense.—A meeting of the Council of National Defense was held at 10 o'clock Monday morning for the further consideration of the industrial mobilization of the country for use in an emergency and take up the offers made by manufacturing and commercial establishments to turn their plants over to the government in the event of war.

Both the War and Navy Departments have received many such offers. This statement was issued by the War Department regarding the meeting of the council:

"This call is not based upon any new incident in the international situation; but, as the organization of the industry and commerce of the country for rapid use in time of emergency is the primary purpose of the council, it is thought that these patriotic and numerous voluntary offers afford an especially favorable opportunity for beginning the work of organization and carrying it into speedy execution."

The council also made public the personnel, scheme or organization, and the program for the immediate future of the newly formed committee on standardization of medical and surgical supplies. Two weeks ago Newton D. Baker, Secretary of War, as chairman of the council, after consultation with Dr. Franklin Martin, of the advisory commission to the council, issued an invitation to Secretary Daniels as head of the naval bureau of medicine and surgery, to Secretary McAdoo as having jurisdiction over the Public Health Service, and to the medical division of the Council of National Defense, asking them to make nominations for membership on the committee on standardization of medical and surgical supplies.

The committee was named as follows:

Dr. George W. Crile, Cleveland, Ohio.

professor of clinic surgery, Western Reserve University, and surgeon Lakeside Hospital.

Dr. Harvey Cushing, professor of surgery, Harvard University, and chief surgeon of the Peter Bent Brigham Hospital, Boston.

Lieutenant Colonel Carl R. Darnall, U. S. Army medical corps.

Dr. Carl L. Gibson, adjunct professor of surgery, Cornell University Medical College, and surgeon New York Hospital.

Dr. Richard H. Harts, surgeon to Pennsylvania and Orthopoedic Hospitals, Philadelphia.

Colonel Jefferson R. Kean, director of military relief, American National Red Cross.

Dr. Joseph A. Murphy, surgeon, bureau of medicine and surgery, Navy Department.

Dr. Henry S. Plummer, the Male Clinic, Rochester, Minn.

Dr. T. W. Richards, American National Red Cross.

General K. C. Rucker, assistant surgeon general, U. S. Public Health Service.

Dr. Frank F. Simpson, chief of medical division, Council of National Defense.

The committee on standardization met in Washington on February 12. The purpose was to formulate plans by which standardization of all medical and surgical equipment in the country can be effected. Subcommittees will be appointed to represent every branch of medicine and report regarding articles which they deem essential to the successful conduct of their work. These various reports will be collated with the idea of standardizing supplies needed for the governmental departments of medicine on one hand and for civilian activities on the other.

The objects of the proposed standardization are: To make it possible to obtain surgical supplies in large volume on short notice; to have definite specifications so that manufacturers of similar articles may divert their activities with a minimum of delay or inconvenience to the production of supplies required by the Army and Navy; to reduce cost by enabling manufacturers to produce the various articles in quantity, and to enable civilian practitioners to become familiar with the instruments and appliances which they will be expected to use if they are called to the colors.—Army and Navy Register.

ARMY DENTAL CORPS.

Appointments in the Army.—Congressional Record: Nominated, Feb. 10th, 1917. Dr. Maurice W. Haag, of Pennsylvania, to be dental surgeon from Feb. 2nd, 1917, to fill an original vacancy.

Notes from the 1916 Report of the Surgeon General of the Navy.—*Rejections for enlistment from defective teeth, 7.751.

Summary of dental operations performed during calendar year, 1915.

Character of Operations.	Number.
Abscesses treated	1,799
Bridges (made, repaired, removed and reset)	198
Calculus removed	7,634
Crowns (made, repaired, removed and reset)	503
Fractured Maxillae treated	27
Gums lanced	833
Necrosed maxillae treated	3
Pulp capped	317
Pulp devitalized	3,806
Pulp extirpated	5,820
Pyorrhea alveolaris (cases treated)	1,776
Root canals filled	7,537
Teeth extracted	6,517
Teeth filled.	
Amalgam	18,699
Cement	9,665
Gold	35
Gutta-percha	5,495
Tin	1
Teeth regulated	112
Treatment other than specified above (cases)	20,874
Total	91,651

Notes from the 1916 report of the Surgeon General of the Army Dental Corps.

Dental Surgeons:

Number of dental surgeons in service June 30, 1915	34	
Appointed during the year	7	
		41
Resigned during year	1	
On duty June 30, 1916	40	
Acting dental surgeons:		
Number of acting dental surgeons in service June 30, 1915	35	35
Acting dental surgeons:		
Number of acting dental surgeons in service June 30, 1915	35	
Appointed during the year	15	
Total	50	
Contracts annulled	8	
		42
Contracts annulled by acceptance of commission as First Lieutenant Dental Surgeon	7	
		35 35
Total number in service of both grades		70

*Rejections for enlistment in the Army from defective teeth:

White: Native born, 83; foreign born, 12; colored, 4; Philippine scouts, 9. Total, 108.

Admission to sick report for diseases of teeth and gums, 549.

Other diseases of the mouth and annexa, 89.

*Note the difference between the number of rejections for defective teeth between the Navy and Army. The Navy requirements are very strict, while the Army requires only four serviceable double (bicuspid or molar) teeth, two above and two below, so opposed as to serve the purpose of mastication."

Summary of operations for dental and oral diseases for Army:

DENTAL CARIES.

	Number of Teeth Treated	Cases Admitted to Treatment	Operations Perfor'd
United States (continental) exclusive of Alaska	41,783	72,747	88,663
Philippine Department	10,703	17,777	18,539
Hawaiian Department	9,351	14,442	15,198
Canal Zone, Panama	3,669	6,516	7,603
China	764	1,244	739
Alaska	592	798	1,057
	66,862	113,524	131,854

"While the tabulation above given does not portray the character of the work performed, which has been varied, yet it indicates either that the dental work of the past years has placed the teeth of those treated in such condition as not to warrant treatment this year, or that the condition of the teeth of new recruits are closely watched with a view to eliminating those not meeting the requirements in this respect."

GORDON WHITE, D. D. S.

(See Frontispiece.)

DIED after a brief illness at his home in Nashville, Tenn., on December 16th, 1916, Gordon White, D. D. S., a genius and one of the world's great dentists. He was born in Pulaski, Tenn., January 3rd., 1857. His father was Dr. Thomas Cathy White, and his mother Nitia Gordon White. His ancestors on both the father and mother's sides were people of sterling worth, and noted for their patriotism and bravery. His ancestors were conspicuous for bravery in the wars of our country from the Revolution down to the close of the Confederacy. His progenitors were residents of the states of Virginia, the Carolinas, Kentucky and Tennessee, and were southern planters. His father, Dr. Thomas Cathy White, whilst a busy practitioner of medicine and surgery, also owned and operated a large farm near Pulaski, Tennessee, where Gordon White was reared. Dr. Thomas C. White had studied and appreciated the value of dental science for the alleviation of many human ills, and being much called upon to relieve the dental ailments of his patients, scattered over a wide, rural and suburban district, became expert in exodontia and the treatment of oral disorders. He had forceps made by the firm of F. Arnold & Sons, of Baltimore, from patterns which he carved in wood, and with these he was notedly expert in the operation of extracting teeth. This work so impressed him with the value of dentistry, and the need for special training in this profession, that he resolved when Gordon was but a lad to make a dentist of him, and to so direct his early training as to fit him to take a high place in this profession.

Gordon was educated at the Giles Military College, Pulaski, Tenn., where he was a good student, but his father's death came just at the close of the war, between the states, when thruout the South the people saw most all their possessions—save their lands—swept away. He was compelled to lend his own services to the conducting of the farm. Therefore, his vacations were busy seasons to this boy who was his mother's pride, joy and hope. His professional training was commenced in the office, and under the direction of Dr. J. T. Grant, of Pulaski. At the same time he was reading medicine under Dr. W. E. Wilson. He entered the Baltimore College of Dental Surgery at the age of 19, from which institution he graduated in 1879. In the last year of his pupilage in Baltimore he met and favorably impressed Dr. L. G. Noel, of Nashville, during a visit to the college, and Dr. Noel, desiring the aid of a young assistant in his practice, after the favorable report of the faculty, and the Drs. Grant of Pulaski, proposed to Dr. White a connection with him at Nashville, which Dr. White accepted in order to be near his mother, previously having declined a position in the College and two flattering offers from two of his professors to remain in the East and an offer to go to Europe. This arrangement lasted three or four years, when Dr. White opened an office of his own, where he conducted a busy and successful practice until his death. Dr. White greatly loved his profession, and was ever a reader of its literature. He early connected himself with its organizations, in which he was a tireless worker up to the time of his death, and in which societies he held many offices of

honor, showing the high esteem in which he was held by his conferees, not only in America, but abroad. He was president of the Tennessee State Dental Association in 1889; President of the Southern Dental Association in 1892; he was elected honorary member of the American Dental Society of Europe in 1896; he was appointed the member from the South of a delegation of three to the International Dental Congress at Paris in 1900 and at the same time commissioned from the State of Tennessee to the Paris Exposition; in 1902 at Stockholm as a delegate from the National Dental Association, he was made a member of a delegation of nine to represent the International Dental Federation at the International Dental Congress in St. Louis in 1904; he was one of the honorary presidents of that Congress; he held membership in the Tennessee State Dental Association, the National Dental Association, the American Medical Association, The Nashville Society of Dental Surgery, Nashville Academy of Medicine, Tennessee State Medical Association, the Delta Sigma Delta Fraternity, and was honorary member of many associations thruout the country.

Dr. White was not a prolific writer, but in the course of his society work he contributed a number of papers, of which may be mentioned the following: Several papers on pyorrhea alveolaris; several papers on orthodontia, several papers on crown and bridge work, and one paper on professional ethics.

He was the inventor of a number of small instruments for use in his profession, on which he placed no patents, but which he gave to the profession; and he spared no labor or expense in testing out every new thing that promised advancement in Dental Science.

Dr. White was a very skillful operator, and was by his professional friends regarded as one of the most superior gold workers in this country. He worked much non-cohesive gold in the foundations of his large restorations. During the latter years of his practice, he gave much time to the treatment of gingival and alveolar diseases, in which he was justly celebrated, because of his extraordinary success.

Dr. White was a genial companion, possessing a keen sense of humor, and this together with his quick sympathy and genuine kindness of heart, endeared him to all who enjoyed his acquaintance, making lasting friends of his patients.

He had a high estimate of the value of dental service when thoroly and skillfully executed, and from those who felt able to pay, he exacted high fees for his work. He urged upon his professional friends the high standard he set for himself, and was ever a leader and uplifter amid his fellow workers.

Dr. White never married, and not being anchored by the ties of a family, he indulged his love of travel, making many trips to Europe and distant lands. He was a student and patron of art, and possessed many valuable original paintings. His visits to the great art centers of the old world gave him exceptional opportunities for the study of the fine arts, and he endeavored to inculcate a love for these in his home city, being a leading spirit and active worker in the Nashville Art Association. He was also fond of books and possessed a fine library.

Dr. White's death leaves a vacancy in the ranks of his profession, and in the social circle that he frequented, which will long be felt by those who knew and loved him.

"IN MEMORIAM RESOLUTIONS."

Dr. Gordon White.

Whereas, Almighty God in his infinite wisdom has seen fit to remove from the scene of his early labors our esteemed colleague, Dr. Gordon White; and

Whereas, the Nashville Society of Dental Surgeons, of which he was an honored member, recognizing his great worth as a contributor to the scientific work of his profession, desires to record its appreciation of him as a man, and its sense of sorrow at his death; therefore,

Resolved, That the members of this association extend to the family of the deceased their sincere sympathy in their bereavement, and that this resolution be spread upon the minutes of the Nashville Society of Dental Surgeons, and that it be forwarded to the dental journals for publication.

L. G. NOEL,
STANLEY RICH,
W. G. HUTCHINSON,
Committee.

Books Received

Books received are acknowledged in this column, and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interests of our readers and as space permits.

Practical Oral Hygiene Prophylaxis and Pyorrhea Alveolaris.—By Robin Adair, B. S., M. D., D. D. S., Professor of Oral Prophylaxis and Pyorrhea Alveolaris, Southern Dental College, Atlanta, Ga. (1911-1913); Oral Surgeon, Grady Hospital (1910-1912); Oral Surgeon to Georgia Baptist Hospital; member Fulton County Medical Society, Georgia State Medical Society, American Medical Association, Georgia State Dental Society, National Dental Association, and First District Dental Society of the State of New York.

Mouth Hygiene.—A Course of Instruction for Dental Hygienists. A Text-book containing the fundamentals for Prophylactic Operation. Compiled by Alfred C. Fones, D. D. S., Bridgeport, Conn., edited by Edward C. Kirk, Sc. D., D. D. S., LL. D.; Rob't. H. W. Strang, M. D., D. D. S., and Alfred C. Fones, D. D. S., Octavo, 530 pages, with 278 engravings and 7 plates. Cloth $5.00 net. Lea & Febiger, Publishers, Philadelphia and New York. 1916.

Internal Anatomy of the Face.—By M. H. Crayer, M. D., D. D. S., Professor of Oral Surgery, University of Pennsylvania; Oral Surgeon to the Philadelphia General Hospital.

The American Year-Book of Anesthesia and Analgesia.—By various Contributors. F. H. McMechan, A. M., M. D., editor. Quarto; art buckram; India tint paper; 420 pages and 250 illustrations. Surgery Publishing Company, 92 William St., New York City, 1916. Price $4.00.

Crown and Bridge-Work. By Frederic A. Peeso, D. D. S., Director of the Dental Graduate School of the University of Pennsylvania. Octavo, 456 pages, with 752 engravings. Cloth, $5.00, net. Lea & Febiger, Publishers, Philadelphia and New York, 1916.

A Text-Book of Dental Pathology and Therapeutics. Based on the Original of Henry H. Burchard, M. D., D. D. S. Rewritten by Otto E. Inglis, D. D. S., Professor of Dental Pathology and Therapeutics in the Philadelphia Dental College. Fifth Edition, thoroly revised. Octavo, 807 pages, with 708 Engravings and one Colored Plate. Cloth, $5.00 net. Lea & Feibiger, Philadelphia and New York, 1915.

Pay your State and National dues immediately. It will be impossible to secure back numbers of The Journal. February issue now entirely exhausted.

NATIONAL SOCIETIES.

National Dental Association, New York City, October 22-26.

National Association of Dental Faculties—New York City, October 19 and 20.

National Association of Dental Examiners, New York City, October 22-23.

STATE SOCIETIES.

March.

Oklahoma—Oklahoma City, March 26, 27, 28, 29.

Rhode Island—Providence, March 23.

April.

Alabama—Birmingham, April 10.

Kansas—Topeka, April.

Michigan—Detroit, April 12, 13 and 14.

Missouri—St. Joseph, April 4, 5, 6.

South Dakota—Sioux Falls, April 26-27.

Texas—Houston, April 25, 26, 27 and 28.

Virginia—Norfolk, April 17, 18 and 19.

West Virginia—Fairmont, April 11, 12, and 13.

May.

Arkansas—Little Rock, May 3, 4 and 5.

Illinois—Quincy, May 8, 9, 10 and 11.

Indiana—Indianapolis, May 15, 16 and 17.

Iowa—Des Moines, May 1, 2, 3 and 4.

Kentucky—Louisville, May 9, 10 and 11.

Massachusetts—Springfield, May 3, 4, and 5.

New York—Rochester, May 10, 11 and 12.

South Carolina—Columbia, May 8.

Southern California — Los Angeles, May.

Vermont—May 16, 17 and 18.

June.

Colorado—Glenwood Springs, June 21, 22, 23.

Connecticut—New London, June 14, 15, 16.

Florida—Atlantic Beach, June 20, 21 and 22.

Georgia—Brunswick, June.

Maryland—Baltimore, June 6, 7, 8. 9.

Nebraska—Omaha, June 4, 5, 6 and 7.

New Hampshire—Soo-Nipi, June 20, 21 and 22.

North Carolina—Durham, June 27, 28 and 29.

Pennsylvania—Philadelphia, June 26, 27, 28.

Tennessee—Memphis, June 19, 20, 21 and 22.

Utah—Salt Lake City, June.

Wyoming—Cheyenne, June 12.

July.

New Jersey—Atlantic City, July 11. 12, 13.

Wisconsin—July 10, 11, 12.

October.

National Capital—Chamber of Commerce, October 2.

Rhode Island—Providence, October.

November.

Arizona—Phoenix, November.

December.

Ohio—Cleveland, December 4, 5, 6.

ANNUAL MEETING NEW YORK DENTAL SOCIETY.

The 49th annual meeting of the Dental Society of the State of New York will be held in Convention Hall, Rochester, N. Y., May 10, 11, 12, immediately following the formal dedication of the Rochester Dental Dispensary.

The program of essays and clinics coupled with other educational features and many forms of entertainment will make this one of the most successful meetings in the history of the New York Society; in fact, it will be one of the big meetings of the year.

The manufacturer's exhibit will be exceptionally beautiful and include practically every well known product, appliance, etc., in the dental trades.

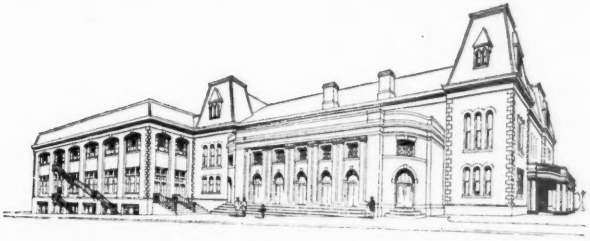
All exhibits, clinics and meetings will be held in Convention Hall, located in the heart of the city and near the hotels, theatres and the retail shopping district.

The month of May is exceptionally beautiful in Rochester, (the Flower City) which is famous for its beautiful homes, parks, scenery and extensive gardens.

The officials and members of the New York Society extend all ethical dentists a most cordial and fraternal greeting to meet with them the assurance on their part that everything possible will be done to make their visit a pleasant and profitable one.

Programs and general information can be obtained of the Secretary, Dr. A. P. Burkhart, 52 Genesee St., Auburn, New York.

GENERAL BUSINESS COMMITTEE,
Rochester, N. Y.
E. G. LINK, Chairman,
226 Cutler Bldg.,
LOUIS MEISBURGER, Buffalo.
WIRT H. CONKLIN, Rochester.



Convention Hall, Rochester, N. Y.

STATE BOARD OF REGISTRATION AND EXAMINATION OF NEW JERSEY.

The State Board of Registration and Examination in Dentistry of New Jersey will hold their annual meeting and examination in the Assembly Chamber, at the State House, Trenton, N. J., on June 25, 26, 27 and 28, 1917. The license fee is $25.00; re-examination fee is $10.00.

The practical tests required are: Insertion of an approximal gold filling, with approximating tooth in position, compound approximal amalgam filling, a silicate filling, practical test of the applicant's ability in oral prophylaxis, and preparation of a cavity for an inlay with wax pattern. Also the soldering of a bridge consisting of three or more teeth, exclusive of abutments, and one Richmond crown, which may be one of the abutments of the bridge. These must be made of gold or silver. Platinum backings may not be used. The bridge must be struck from dies made from an impression of the mouth, and the articulating model, with the bridge, when soldered, must be submitted for inspection.

An anatomical articulation of a full upper and lower set of teeth will also be required. Teeth to be furnished by the applicant. Wax bite, properly trimmed and in place on models for inspection before setting up teeth.

The theoretical subjects upon which candidates will be examined are: Anatomy, Histology, Materia Medica, Therapeutics, Chemistry, Theoretical Prosthetic Dentistry, Crown and Bridge Work, Pathology, Bacteriology, Oral Surgery, Anesthesia, Theoretical Operative Dentistry, Metallurgy, Orthodontia, Physiology, Oral Hygiene and Dental Jurisprudence.

Attention is directed to the following quotation from the Dental Law of New Jersey: "Applicant shall present to said Board a certificate from the Commissioner of Education of this State, showing that before entering a dental college he or she had obtained an academic education consisting of a four-year course of study in an approved public or private high school, or the equivalent thereof." (Those who entered a dental college prior to January 1, 1914, must present a certificate showing a three-year high school course.) In accordance with this law the secretary will issue application blanks only upon presentation of the required certificate from the Commissioner of Education, State House, Trenton, N. J.

Applications must be filed complete ten days before the date of the examination. Address all communications for further particulars to

JOHN C. FORSYTH, Secretary,
430 East State Street,
Trenton, New Jersey.

NEBRASKA STATE DENTAL SOCIETY

The Nebraska State Dental Society will hold its 50th annual meeting June 4, 5, 6, 7, 1917, being postponed from the announced date of May 14, to 17, 1917.

HERBERT E. KING, Secretary,
446 Bee Building,
Omaha, Nebraska.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

Office of the chairman of the
Executive Committee,
B. HOLLY SMITH, M. D., D. D. S.,
405 N. Charles St.,
Baltimore, Md.

The National Association of Dental Facilities will hold its meeting on Friday and Saturday, October 19th and 20th, at the Hotel Astor, New York City.

The Executive Committee to meet at 9 A. M. and General Sessions at 10 A. M. on Friday.

B. HOLLY SMITH, Chairman.

VERMONT STATE DENTAL SOCIETY.

The annual meeting of the Vermont State Dental Society will be held in Rutland, Vermont, May 16th, 17th and 18th. The officers are planning to make this the best meeting ever held in the history of the Vermont State Dental Society.

P. E. MELLEN, Secretary,
Middlebury, Vermont.

THE NEW JERSEY STATE DENTAL GOLF ASSOCIATION.

The New Jersey State Dental Golf Association will entertain all golfing members of the National Dental Association at one of the famous New Jersey courses during the National Convention. All dental golfers bring clubs. Further details later.

S. H. HINMAN, Secretary,
102 Union Avenue,
Cranford, N. J.

ARKANSAS STATE DENTAL ASSOCIATION.

The annual meeting of the Arkansas State Dental Association will be held at the Marion Hotel, Little Rock, Arkansas, May 3, 4, and 5.

H. J. CRUME, Secretary,
Hamburg, Arkansas.

TEXAS STATE DENTAL SOCIETY.

The next annual convention of the Texas State Dental Society will be held in Houston, April 25th to the 28th. There will be no night sessions.

We are planning to make this one of the greatest meetings ever held by the Texas State Dental Society.

W. O. TALBOT, Secy-Treas.,
Fort Worth, Texas.

MASSACHUSETTS STATE DENTAL SOCIETY.

The Fifty-third annual meeting of the Massachusetts State Dental Society will be held on May 3, 4 and 5, 1917, at Springfield, Massachusetts.

J. ARTHUR FURBISH, D. M. D.,
Secretary,
400 Marlborough Street,
Boston, Massachusetts.

WEST VIRGINIA STATE DENTAL SOCIETY.

The West Virginia State Dental Society will hold its annual meeting in Fairmont, West Virginia, April 11, 12, 13, 1917. A most cordial welcome will be given to members of the National Dental Association.

J. W. PARSONS, Secretary,
Huntington, West Virginia.

CONNECTICUT STATE DENTAL ASSOCIATION.

The fifty-third annual meeting of the Connecticut State Dental Association will be held at the Hotel Griswold, New London, Connecticut, June 14th, 15th and 16th, 1917.

We extend a cordial invitation to all members of the National Dental Association.

GEO. S. B. LEONARD, Secretary,
Mystic, Conn.

RHODE ISLAND DENTAL SOCIETY.

The next regular quarterly meeting of the Rhode Island Dental Society will be held in Providence at the Medical Library on March 23rd at eight o'clock.

CHAS. J. SMITH, Secretary,
315 Butler Exchange,
Providence, R. I.

TENNESSEE STATE DENTAL SOCIETY.

The Golden Jubilee of the Tennessee Dental Society will be held in Memphis, June 19, 20, 21, 22. The officers promise the most attractive program ever presented in the South. Social features will be prominent. All ethical dentists invited—come and bring your wives.

D. M. CATTELL, President.
C. E. HINES, Secretary.

MISSOURI STATE DENTAL SOCIETY.

The fifty-second annual meeting of the Missouri State Dental Society will convene at St. Joseph, April 4, 5, 6, 1917. A splendid program is in course of preparation and will be papers from some of the best men the country affords.

The clinic program will provide new ideas and new methods that will more than repay you for your trip and enable you to do much for your patients that will cause them to appreciate you more in the future.

J. F. WALLACE, Secretary,
Canton, Missouri.

SCUTH DAKOTA STATE DENTAL SOCIETY.

The next annual meeting of the South Dakota State Dental Society will be held at Sioux Falls, April 26th and 27th. All members of the National Dental Association, or any State Society are cordially invited to attend.

ERNEST W. ELMEN, Secretary,
Sioux Falls, S. Dak.

VIRGINIA STATE DENTAL ASSOCIATION.

Virginia State Dental Association will meet in Norfolk, April 17th, 18th and 19th, 1917. All members of the National Dental Association, or any State Society, are cordially invited to attend.

C. B. GIFFORD, Norfolk, Va.,
Corresponding Secretary.

NORTH CAROLINA DENTAL SOCIETY

The North Carolina Dental Society will hold its forty-third annual meeting at Durham, N. C., June 27, 28 and 29, 1917. R. M. SQUIRES, Sec'y.,
Wake Forest, N. C.

KENTUCKY STATE DENTAL SOCIETY.

The next annual meeting of the Kentucky State Dental Association will be held at Louisville the three days previous to the Kentucky Derby—May 9, 10, 11, 1917. Address all correspondence to the Secretary.

W. M. RANDALL, Secretary,
1035 Second Street.
Louisville, Kentucky.

THE NEW JERSEY STATE DENTAL SOCIETY.

The forty-seventh annual convention of the New Jersey State Dental Society will be held at Atlantic City, N. J., on July 11, 12, 13, 1917.

The entire convention will be held on Young's Million Dollar Pier.

Machinery Hall will be used for the exhibits. Dr. George W. Wakeley, of Orange, N. J., is chairman of the committee and with 25,000 square feet of space available, expects to have the greatest display of dental goods in the history of the Society.

Machinery Hall Extension, with about 10,000 square feet of space, will give ample space for clinics and meetings.

Dr. Charles A Spahn, of Newark, N. J., is chairman of the Clinic Committee and will present some entirely new clinics.

Dr. Raymond A. Albray, of Newark, N. J., chairman of the Essay Committee, has arranged for essayists of prominence, whose names will be announced later.

The headquarters of the Society will be on the pier and mail may be directed to exhibitors, clinicians, or members in care of the Secretary of the New Jersey State Dental Society, Young's Million Dollar Pier, Atlantic City, N. J.

A list of hotels where special rates may be secured will be published in The Journal and mailed prior to the convention.

A cordial invitation to attend is extended to all ethical practitioners.

JOHN C. FORSYTH, Sec'y,
430 East State Street,
Trenton, New Jersey.

MICHIGAN STATE DENTAL SOCIETY.

Detroit, the wonder city of the middle west, will be the meeting place of the sixty-first annual meeting of the Michigan State Dental Society, April 12, 13 and 14, 1917.

The growing necessity for individual efficiency in dental operations, should find seven out of the eight hundred members of the society present. "It is for Better Dentistry."

All ethical Dentists are invited to attend and become members, and members of other Associations are cordially invited. C. G. BATES, Secretary.

SOUTH CAROLINA STATE DENTAL SOCIETY.

The forty-seventh annual meeting of the South Carolina State Dental Association will be held in Columbia, S. C., at the Jefferson Hotel, commencing May 8th, 1917.

ERNEST C. DYE, Secretary,
Greenville, S. C.

OKLAHOMA STATE DENTAL SOCIETY.

The Oklahoma State Dental Society will hold their meeting in Oklahoma City, March 26, 27, 28, 29. The talent for this meeting is Dr. Weston A. Price, Cleveland; Dr. W. E. Cummer, Toronto, Canada; Dr. Arthur E. Smith, Chicago; and Dr. Wm. E. Harper, Chicago.

The program will cover the most important subjects in dentistry and will be especially good. The meeting will be conducted on the usual plan for Oklahoma, the post graduate plan. The first day of the meeting will be "Oklahoma Day." No one can afford to stay away.

W. E. FLESHER, Secretary,
Frederick, Okla.

FOUR STATES POST GRADUATE DENTAL MEETING.

Alabama, Mississippi, Texas, Louisiana, June 4-7, 1917.

The Four-State Post Graduate Dental Meeting to be held in New Orleans June 4th, 5th, 6th and 7th, 1917, has perfected the following plans:

Organization—An official committee selected from each State by their respective State Dental Associations.

The committee elected by the Louisiana State Dental Society on October 3rd, 1916, is divided into special committees, the chairmen of which are residents of the place of meeting. General sessions will be presided over in turns by the Presidents of the Dental Organizations of the four states.

Date—Votes polled from the members of the four states' committees fixed the meeting time for the early part of June, 1917. Records of the United States Weather Bureau show that the highest afternoon temperature from June 4th to June 10th of this year was 91 degrees. This occurred but twice between those dates. The habitual temperatures at that time are 77 degrees in the morning, 86 in the afternoon, and 79 in the evening. The same records, covering the last five years, show that summer warm weather does not occur in New Orleans prior to June 20th.

Meeting dates from June 4th to June 7th have, besides the advantage of open air freedom, that of securing favorable hotel rates, a most comfortable and ideally ventilated meeting hall high up under the same roof, the use of theatres, and last, but not least, experts in the work to be covered by the meeting, not accessible at an early time in the year.

Scope—The subjects which will be covered during the meeting proper, by illustrated lectures, moving pictures, and clinics, and which will be given in their entirety, lacking only individual instruction to each member of the meeting, are:

Removable Bridgework, with the Most Advanced Lock and Saddle Construction. Instructor to be announced later.

Dr. Norman Beverly Nesbit, of Harvard Dental School, Boston, Mass., will present "New Methods of Replacing Lost Teeth Without Mutilation of Sound Members by a System of Saddles, Cast Inlay-Fitting Clasps, Etc.," as well as many new ideas in casting, newer alloys, etc., fully illustrated by stereopticon, charts, models, etc., and technical demonstrations.

Nerve Blocking will be handled by Dr. Arthur E. Smith, of Chicago, who will come prepared to cover the subject in all of its phases, including the various phases of local anesthesia. His work will be demonstrated thru the medium of a number of especially prepared wet dissected specimens, skulls, slides, maps, kymographic tracings, about two hundred stereopticon slides and something like six thousand feet of motion pictures.

Radiography; Root Canal Preparation and Filling; Apiectomy. Instructors to be announced.

Treatment of Fractures of Maxillæ and Mandible. Instructor to be announced.

Treatment of the Maxillary Sinus. Instructor to be announced.

Prophylaxis, Periodontia, and Stomatology. Instructor to be announced.

Experts placed in charge of the above subjects will each give special courses, starting immediately after the meeting, and lasting two or three days, or a little longer where the nature of the work requires it. Classes will be formed from among holders of membership cards to the meeting, which none but ethical dentists can obtain. These classes must necessarily be limited in size. Early application for membership and for special courses is urged, and the latter cannot be had without the former. Enrollment in the order of registration. Apply to Dr. C. V. Vignes, Chairman Committee on Credentials and Registrations, 709 Macheca Building, New Orleans.

Fees—The committees representing the Four states will conjointly fix membership fees, also the cost per capita to class members for each special course. These will be made just sufficient to cover the expenditures of the meeting and of importing recognized experts in the different lines of work to be covered. Publication by the Committee on Program and Finance, Dr. S. H. McAfee, Chairman, No. 1237 Maison Blanche Building, New Orleans, as soon as settled.

Publicity—The Committee on Publicity, Dr. J. P. Wahl, Chairman, 1135 Maison Blanche Building, New Orleans, will shortly issue summaries of the work to be taught by each instructor at the meeting. Reports, all of which will, of course, be published, are being prepared relative to:

Arrangements, Railroad and Hotel Rates, Dr. O. L. Loeffel, Chairman, 727 Maison Blanche Building, New Orleans;

Exhibits, Dr. C. S. Tuller, Chairman, 729 Maison Blanche Building, New Orleans;

Entertainment (for the ladies while the men are hard at work), Dr. Leo C. Dempsey, Chairman, 943 Jackson Avenue, New Orleans;

Clinics, Dr. J. A. Gorman, Chairman, 639 Maison Blanche Building, New Orleans;

Floor Arrangements, Dr. E. B. Ducasse, 735 Maison Blanche Building, New Orleans.

THE LOUISIANA COMMITTEE,
Jules J. Sarrazin, General Chairman.
Leo. C. Dempsey, General Secretary.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The next meeting of the National Association of Dental Examiners will be held October 22nd and 23rd, 1917, at Hotel Astor, New York City.

J. A. WEST, Secretary,
Des Moines, Iowa.

CONTRIBUTIONS.

CONTRIBUTIONS TYPEWRITTEN.

Contributions should be typewritten—**double-spaced and with ample margins.** The expense is small to the author—the satisfaction is great to the editor and printer. We cannot promise to return unused manuscript, but try to do so in every instance. **Used manuscript is not returned.** Manuscripts should not be rolled.

ILLUSTRATIONS.

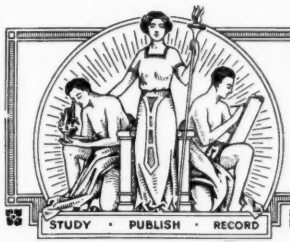
Half-tones and zinc etchings will be furnished by The Journal when satisfactory photographs or drawings are supplied by the author. Negatives are not acceptable. Each illustration, table, etc., should bear the author's name on the back. Photographs should be clear and distinct; drawings should be made in black ink on white paper. While we cannot guarantee to return used photographs and drawings, we use our best endeavors to do so after the article is published.

ANONYMOUS CONTRIBUTIONS,

Whether for publication, for information, or in the way of criticism, are consigned to the waste-basket.

NEWS.

Our readers are requested to send in items of news, also **marked** copies of newspapers containing matters of interest to dentists. We shall be glad to know the name of the sender in every instance.



NATIONAL DENTAL ASSOCIATION ANNOUNCEMENTS

The National Dental Association will meet in New York City October 22nd, 23rd, 24th, 25th and 26th. The Headquarters will be at the Hotel Astor, situated on Broadway, at 44th and 45th streets. This hotel has the largest ball room in the world, and this room will be used for all the General Session meetings. Other large ball rooms will accommodate the Sections, House of Delegates, etc., etc. The Exhibits will be shown in the beautiful Roof Gardens. Thus practically all of the meetings will occur under the roof of this spacious hotel.

Full accounts of the plans of what promises to be the largest and greatest meeting in the history of the Association will be published later. Suffice it for the present to state that the slogan for this year will be:

"QUALITY RATHER THAN QUANTITY."

Nevertheless there will be quantity also. But the important announcement at this time must be the warning, **"Reserve your rooms at once. Make reservations by mail direct to the hotel of your choice."** This may seem premature considering the abundance and variety of hotel accommodations listed below. But New York hotels are always crowded. Nearly seven hundred conventions met here during 1916. October is one of the busiest months. If you desire to get into any particular hotel, therefore, it will be safest to write at once. For example, 150 rooms have been reserved at the Headquarters Hotel, The Astor, already.

The following is a list of hotels and rates:

HOTEL ASTOR, TIMES SQUARE, 1000 ROOMS.

(General and Registration Headquarters.)

Single with bath	$ 4.00	$ 5.00	$ 6.00
Double with bath	5.00	6.00	7.00
Two Connecting Rooms with bath (3 persons)	9.00	10.00	11.00
Two Connecting Rooms with bath (4 persons)	10.00	11.00	12.00

HOTEL McALPIN, BROADWAY AND 34TH STREET, 1600 ROOMS.

Single without bath	$2.50	$3.00	
Single with bath	3.00	3.50	4.00
Double without bath	3.50	4.00	
Double with bath	4.00	4.50	5.00
Parlor, Bedroom, and Bath (for 1 or 2)	6.00	7.00	8.00

HOTEL WALDORF ASTORIA, FIFTH AVENUE AND 34TH STREET, 1300 ROOMS.

Single without bath	$ 3.00
Single with bath	4.00
Double without bath	4.00
Double with bath	6.00
Parlor, Bedroom, and Bath (for 1 or 2)	14.00

HOTEL BALTIMORE, MADISON AVENUE AND 43RD STREET, 1000 ROOMS.

Single with bath	$4.00	$5.00
Double with bath	6.00	7.00

HOTEL MANHATTAN, MADISON AVENUE AND 42ND STREET, 700 ROOMS.

Single without bath	$2.50	
Single with bath	3.50	$4.00
Double with bath	5.00	

HOTEL ALBEMARLE, BROADWAY AND 54TH STREET.

Single with bath	$2.00
Double with bath	3.00
Parlor, Bedroom, and Bath (2 persons)	4.00

HOTEL ALGONQUIN, 59 WEST 44TH STREET, 250 ROOMS.

Single with bath	$2.50	
Double with bath	3.50	
Double Bedroom, Sitting Room, and Bath	5.00	$6.00

HOTEL ANSONIA, BROADWAY AND 73RD STREET, 1600 ROOMS.

Single without bath	$ 2.00
Single with bath	2.50
Double without bath	3.00
Double with bath	5.00
Two Connecting Rooms with bath	6.00
Three Connecting Rooms with bath	10.00

HOTEL ARLINGTON, 18 WEST 25TH STREET, 175 ROOMS.

European Plan.

Single without bath	$1.50
Double without bath	2.50
Single with bath	2.00
Double with bath	3.00
Parlor, Bedroom, and Bath (1 person)	3.00
Parlor, Bedroom, and Bath (2 persons)	4.00

American Plan.

Single without bath	$3.00
Double without bath	5.50
Single with bath	3.50
Double with bath	6.00
Parlor, Bedroom, and Bath (1 person)	4.50
Parlor, Bedroom, and Bath (2 persons)	7.00

HOTEL BERKLEY, 170 WEST 7TH STREET, 300 ROOMS.

Single Room with bath	$3.00
Double Room with bath	5.00

HOTEL BUCKINGHAM, FIFTH AVENUE AND 50TH STREET, 260 ROOMS.

Single without bath	$1.50
Single with bath	2.50

Extra persons, $1.00 each.

HOTEL BRISTOL, 122 WEST 49TH STREET, 180 ROOMS.

European Plan.

Single with running water	$1.50
Double with running water	2.00
Single with bath	2.00
Double with bath	3.00
Two Rooms with bath (2 persons)	$2.00 each
Two Rooms with bath (3 persons)	1.75 each
Two Rooms with bath (4 persons)	1.50 each

American Plan.

Single with running water	$3.00
Double with running water	5.00
Single with bath	3.50
Double with bath	6.00
Two Rooms with bath (2 persons)	$3.50 each
Two Rooms with bath (3 persons)	3.25 each
Two Rooms with bath (4 persons)	3.00 each

HOTEL CLARIDGE, BROADWAY AND 44TH STREET, 250 ROOMS.

Single with running water	$2.50	
Single with bath	$3.00	$6.00
Double with running water	3.50	
Double with bath	4.00	8.00
Parlor, Bedroom, and Bath	8.00	

HOTEL COLLINGWOOD, 45 WEST 35TH STREET, 250 ROOMS.

Single without bath	$1.50	
Double without bath	2.00	
Single with bath	2.50	
Double with bath	3.00	$3.50
Sitting Room, Bedroom, and bath (for two)	5.00	
Sitting Room, Two Bedrooms, and bath (for three)	7.50	

HOTEL CUMBERLAND, BROADWAY AT 54TH STREET, 250 ROOMS.

Single with adjoining bath	$1.50	2.00
Double with adjoining bath	2.50	3.00
Single with private bath	2.00	2.50
Double with private bath	3.00	3.50
Parlor, Bedroom, and Bath (for one or two)	4.00	5.00

HOTEL EARLE, 103 WAVERLY PLACE, 150 ROOMS.

	E. P.	A. P.
Single with bath	$2.00	$3.50
Double with bath	3.00	5.00
Parlor, Bedroom, and Bath (for one)	4.00	6.00
Parlor, Bedroom, and Bath (for two)	5.00	7.00

HOTEL HERALD SQUARE, 114 WEST 34TH STREET, 310 ROOMS.

Single with bath	$2.00
Single with privilege of bath	1.50
Parlor, Bedroom, and Bath	5.00

HOTEL HOLLAND HOUSE, FIFTH AVENUE AND 30TH STREET, 350 ROOMS.

Single with bath	$3.00
Double with bath	4.00
Two rooms with bath (for 4 people)	8.00
Parlor, Bedroom, and Bath (for 2 people)	5.00 $6.00

HOTEL HOLLEY, WASHINGTON SQUARE WEST, 200 ROOMS.

	E. P.	A. P.
Single with bath	$1.50	$3.00
Double with bath	2.50	5.00

HOTEL IMPERIAL, BROADWAY AND 32D STREET, 800 ROOMS.

Single with use of bath	$2.00
Single with private bath	2.50 $3.00
Double Rooms with use of bath	3.00
Double with private bath	4.00
Two Connecting Rooms, private bath	5.00

(For an additional person in room, $1.00 per day extra.)

HOTEL JUDSON, 53 WASHINGTON SQUARE, 200 ROOMS.

	E. P.	A. P.
Single with running water	$1.00	$2.50
Double with running water	2.00	5.00
Single with bath	1.50	3.00
Double, private bath	2.50	6.00

HOTEL LE MARQUIS, 12 EAST 31ST STREET, 170 ROOMS.

	E. P.	A. P.
Single without bath (for 1 person)	$1.50	$3.00
Double without bath	2.00	5.00
Single with bath	2.00	3.50
Double with bath	3.00	6.50

HOTEL LEONORI, MADISON AVENUE AND 63D STREET, 225 ROOMS.

Single without bath	$1.50
Double with bath (for 1 or 2 persons)	3.00
Parlor, Bedroom, and Bath (for 1 or 2)	5.00 6.00
Parlor, Two Bedrooms, and Baths	8.00 10.00

HOTEL MAJESTIC, WEST 72D STREET, AT CENTRAL PARK, 700 ROOMS.

Single with bath detached	$2.00
Double with bath detached	3.00
Single with private bath	2.50
Double with private bath	4.00
Salon, Bedroom, and Bath	6.00
Salon, Two Bedrooms, and Bath	8.00

HOTEL MARGARET, 95 COLUMBIA HEIGHTS, BROOKLYN, 200 ROOMS

Single without bath	$1.00
Single with bath	2.00
Bedroom, Parlor, and Bath (for 1 person)	3.00

(For an additional person in room, 50 cents per day extra.)

MARIE ANTOINETTE, BROADWAY AND 66TH STREET, 500 ROOMS.

Single with running water	$2.00
Double with running water	4.00
Single with bath	3.00
Double with bath	5.00
Parlor, Bedroom, and Bath	8.00

HOTEL MARTINIQUE, BROADWAY AND 32D STREET, 625 ROOMS.

Single with privilege of bath	$2.00
Single with bath	2.50
Double with privilege of bath	3.00
Double with bath	3.50
Parlor, Bedroom, and Bath (for 1 or 2)	6.00

HOTEL MURRAY HILL, PARK AVENUE AND 40TH STREET, 600 ROOMS.

Single without bath	$2.00
Single with bath	3.00
Double without bath	3.00
Double with bath	4.00
Two Connecting Rooms with bath (for 2)	5.50
Two Connecting Rooms with bath (for 3)	6.50
Two connecting rooms with bath (for 4)	7.50

HOTEL PIAZA, FIFTH AVENUE AND 58TH STREET, 750 ROOMS.

Single with bath	$3.50
Double with bath	4.00
Two Connecting Rooms with bath (for 3)	7.00
Sitting Room, Double Bedroom, and Bath	10.00

HOTEL PRINCE GEORGE, FIFTH AVENUE AND 28TH STREET, 750 ROOMS.

Single with bath	$2.50
Double with bath	4.00

(For each additional person $1.00 extra each day.)

HOTEL RITZ-CALTON, MADISON AVENUE AND 46TH STREET, 425 ROOMS.

Single with bath	$5.00	
Double with bath	$7.00	$10.00

HOTEL ST. MARGARET, 129 WEST 47TH STREET, 130 ROOMS.

Single with running water	$1.00
Single with bath	1.50
Two Rooms and bath	3.50

HOTEL SAINT PAUL, 60TH STREET AND COLUMBUS AVENUE.

Single without bath	$1.00
Single with bath	2.00

(For each additional person in room, $1.00 extra.)

HOTEL SEVILLE, MADISON AVENUE AND 29TH STREET, 475 ROOMS.

Single without bath	$1.50
Double without bath	2.50
Single with bath	2.50
Double with bath	3.00

HOTEL SOMERSET, 150 WEST 47TH STREET, 225 ROOMS.

Single	$2.00
Double	3.00
Parlor, Bedroom, and Bath	4.00

HOTEL VANDERBILT, 34TH STREET AND PARK AVENUE, 600 ROOMS.

Single with bath	$3.00
Double with bath	5.00

HOTEL VAN RESSELAER, ELEVENTH STREET NEAR 5TH AVE., 200 ROOMS.

	E. P.	A. P.
Single with bath	$1.50	$3.00
Double with bath	2.00	5.00
Parlor, Bedroom, and Bath (for 2)	2.50	6.00
Parlor, Bedroom, and Bath (for 3)	3.00	8.00

HOTEL WEBSTER, 40 WEST 45TH STREET, 160 ROOMS.

Single with bath	$2.50
Double with bath	3.50
Three Rooms with bath (for 1 in room)	2.50
Three Rooms with bath (for 2 in room)	2.00 each
Parlor, Bedroom, and Bath (for 2)	4.00

HOTEL WOLCOTT 31ST AND FIFTH AVENUE, 300 ROOMS.

Single without bath	$2.00
Single with bath	2.50
Double with bath	5.00

HOTEL WOODSTOCK, 43RD STREET NEAR BROADWAY, 365 ROOMS.

Single without bath	$2.00
Single with bath	2.50
Double with bath	3.00
Double with bath	3.50
Two Double with bath	8.00
Two Single with bath	5.00
Double and Single (for 3)	5.50
Sitting Room, Bedroom, and Bath (for 1 or 2)	7.00

HOTEL WOODWARD, BROADWAY AND 55TH STREET, 400 ROOMS.

Single without bath	$1.50
Single with bath	2.00
Double with bath	3.00
Two Connecting Rooms with bath (for 2 or 3)	4.00

A copy of the list of Hotels and Rates in pamphlet form will be sent to any member of the National Dental Association on application. Please inclose stamp.

R. OTTOLENGUI, Chairman Publicity Committee,
80 West 40th Street, New York City.